Exhibit A

US011399705B2

(12) **United States Patent**
Packouz et al.

(10) **Patent No.: US 11,399,705 B2**
(45) **Date of Patent: *Aug. 2, 2022**

(54) **APPARATUS FOR DENTAL IRRIGATION**

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(72) Inventors: **Elimelech Packouz**, North Miami, FL (US); **Ralf Raud**, Sarasota, FL (US)

(73) Assignee: **EHT, LLC**, North Miami, FL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 63 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/611,142**

(22) PCT Filed: **Feb. 13, 2019**

(86) PCT No.: **PCT/US2019/017897**
§ 371 (c)(1),
(2) Date: **Nov. 5, 2019**

(87) PCT Pub. No.: **WO2019/160989**
PCT Pub. Date: **Aug. 22, 2019**

(65) **Prior Publication Data**

US 2020/0077875 A1 Mar. 12, 2020

Related U.S. Application Data

(60) Provisional application No. 62/629,904, filed on Feb. 13, 2018.

(51) **Int. Cl.**
A61C 17/02 (2006.01)
A61B 1/06 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 1/06*** (2013.01); ***A46B 9/045*** (2013.01); ***A46B 11/0006*** (2013.01); ***A61B 1/24*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC ... A61C 17/02; A61C 17/0211; A61C 17/028; A61C 17/228; A61C 17/16;
(Continued)

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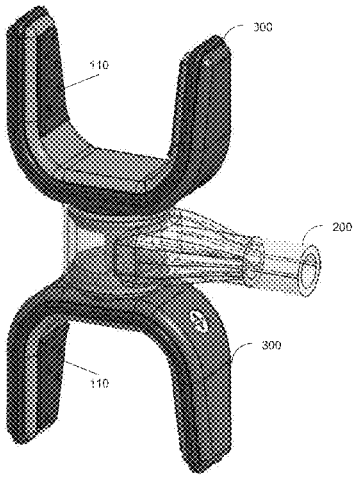
Primary Examiner — Matthew M Nelson
(74) *Attorney, Agent, or Firm* — Bekiares Eliezer LLP

(57) **ABSTRACT**

An apparatus for dental irrigation may be provided to project fluid onto the surfaces of, and the interproximal spaces between, a user's teeth and gum-line. The apparatus may comprise two hollow U-shaped manifolds having orifices located on their interior faces used as fluid jets. The manifolds may be connected, at a central point of reflection, by a rotating inlet joint which supplies the fluid flow. When placed in the user's mouth, the apparatus may be designed to receive the top and bottom sets of teeth in each corresponding U-shaped manifold, with orifices configured to provide fluid jets aligned towards the lingual and buccal side of the teeth. The orifices may be staggered to provide staggered fluid flow. A user's teeth may be cleaned with a
(Continued)



controlled fluid flow by moving the apparatus in a sweeping motion between each set of rear molars.

68 Claims, 28 Drawing Sheets

(51) **Int. Cl.**

A46B 9/04	(2006.01)
A46B 11/00	(2006.01)
A61B 1/24	(2006.01)
A61B 5/00	(2006.01)
A61C 9/00	(2006.01)
A61C 17/028	(2006.01)
A61H 13/00	(2006.01)

(52) **U.S. Cl.**
CPC ***A61B 5/0088*** (2013.01); ***A61C 9/0053*** (2013.01); ***A61C 17/028*** (2013.01); ***A61C 17/0211*** (2013.01); *A46B 2200/108* (2013.01); *A46B 2200/1026* (2013.01); *A61H 13/005* (2013.01)

(58) **Field of Classification Search**
CPC A61C 9/0053; A46B 2200/108; A46B 2200/1026; A46B 9/045; A46B 11/0006; A61B 1/06; A61B 5/0088; A61B 1/24
USPC 433/29, 80
See application file for complete search history.

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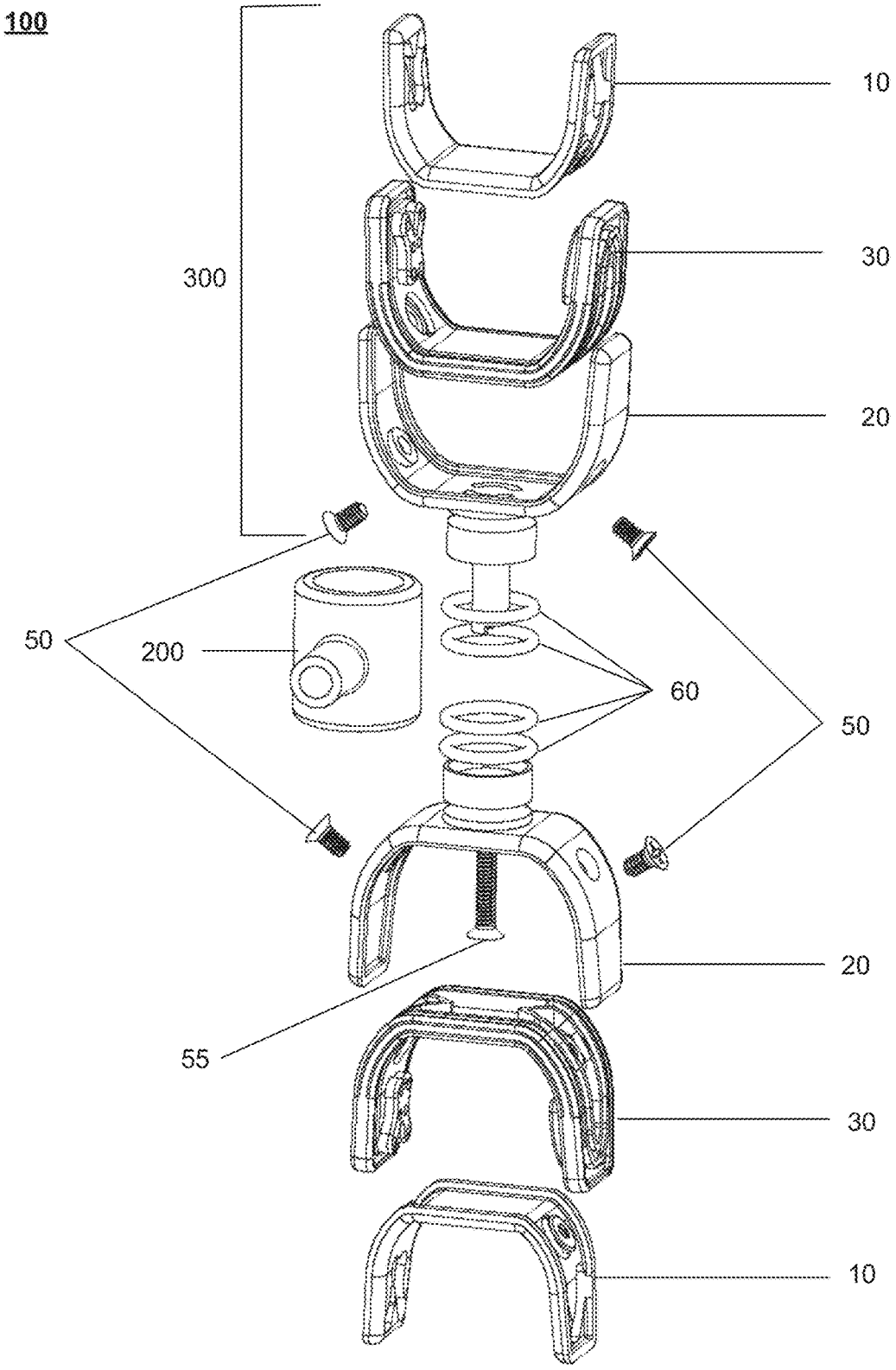

FIG. 1

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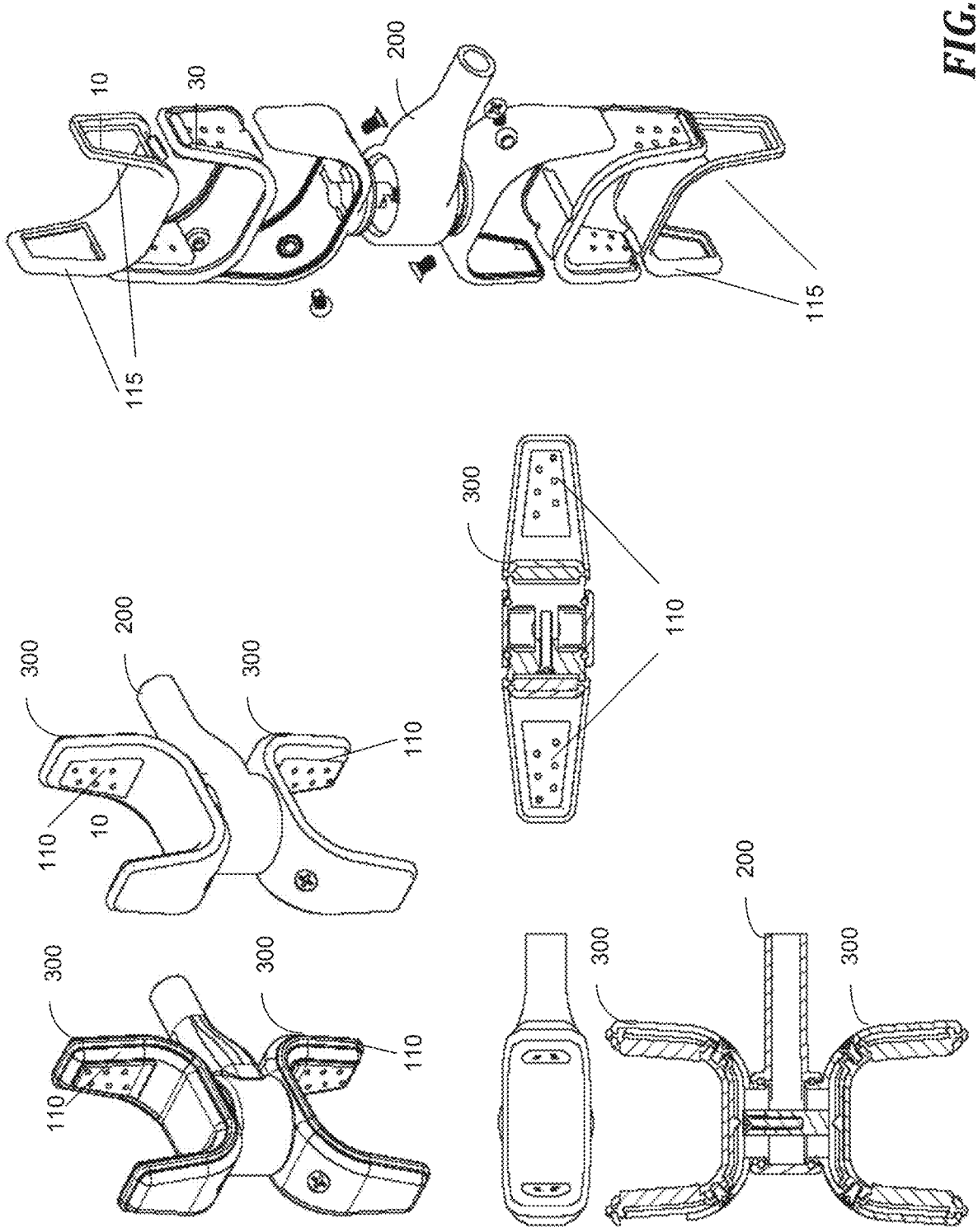
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FIG. 3

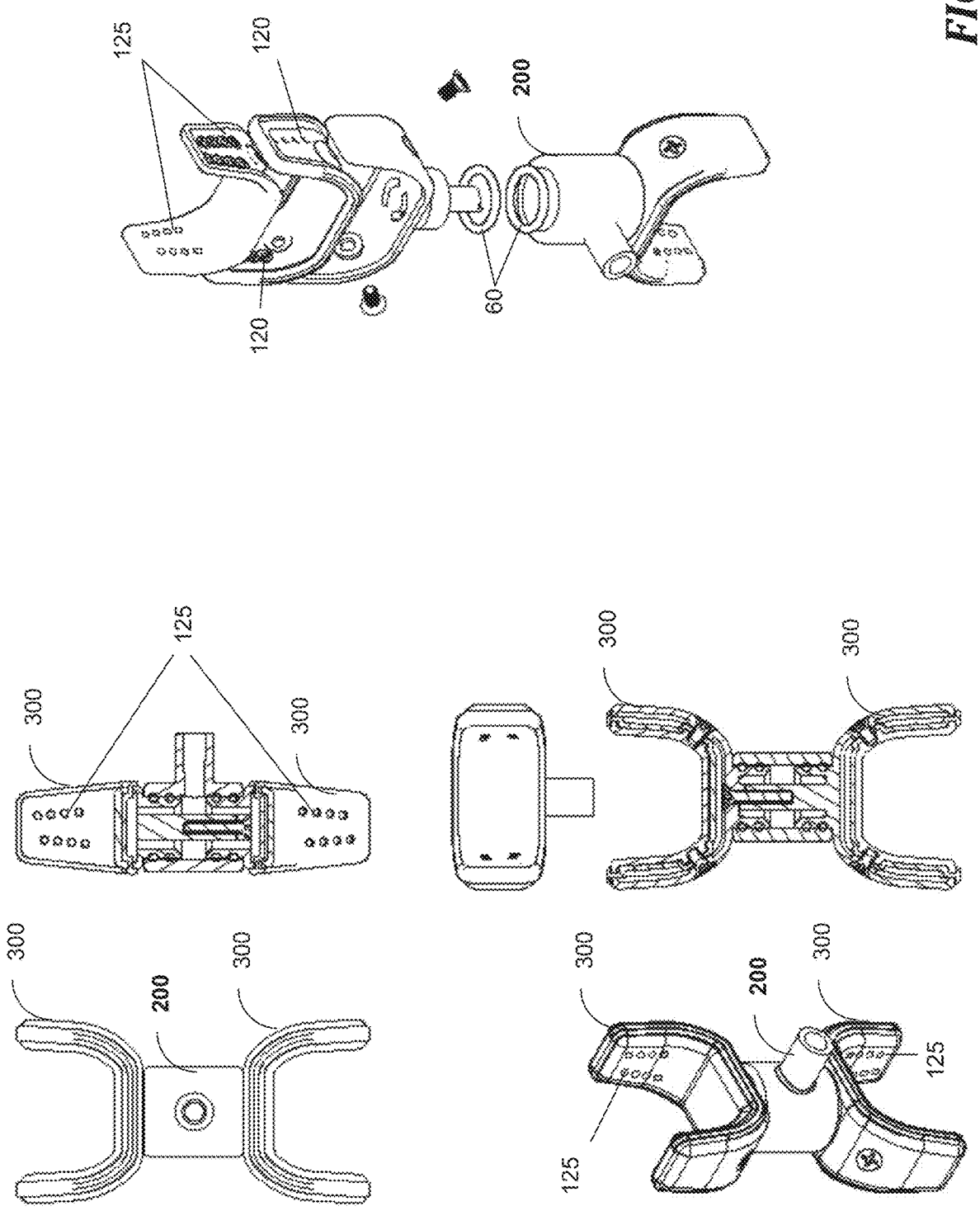
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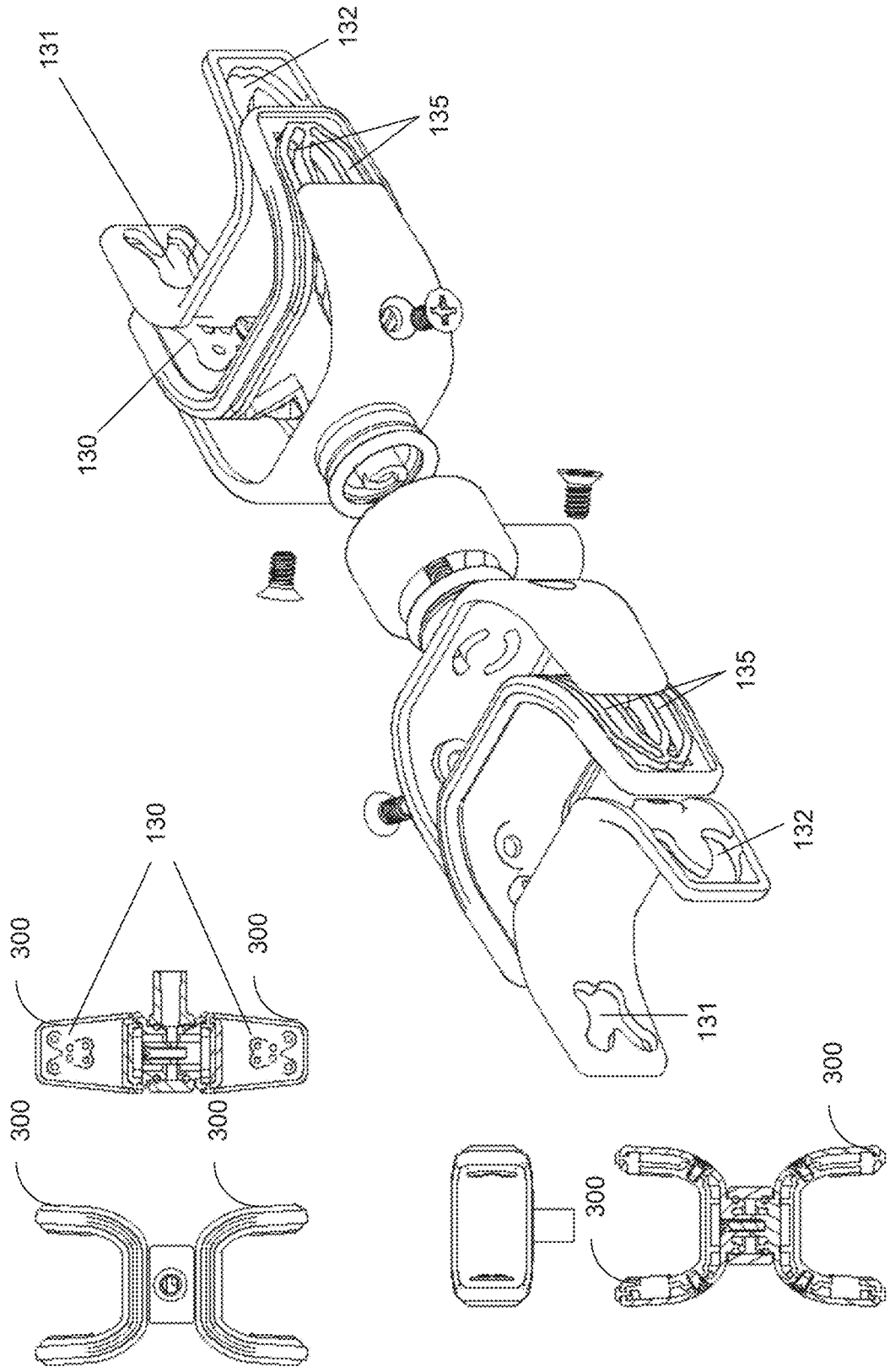
FIG. 4



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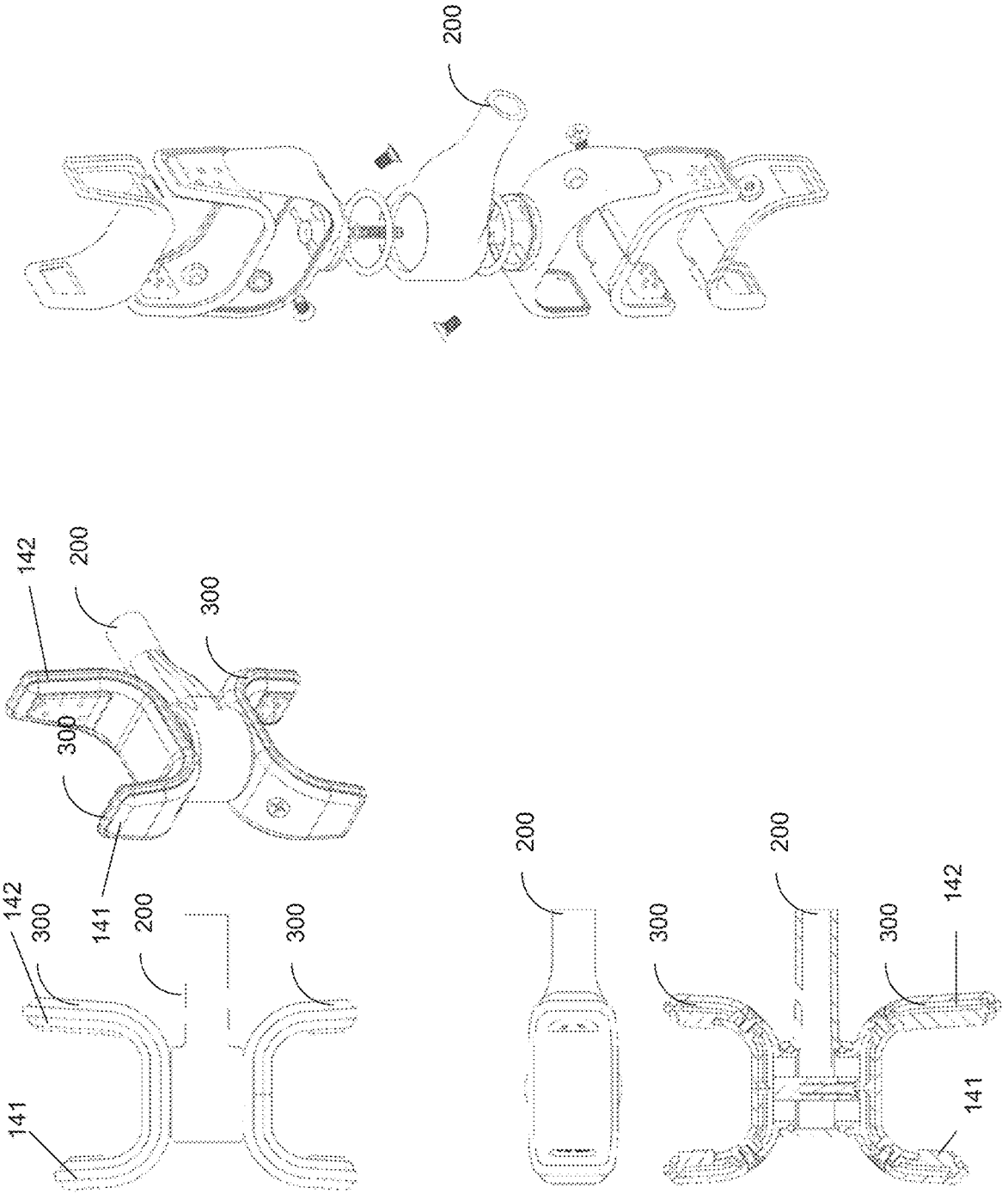
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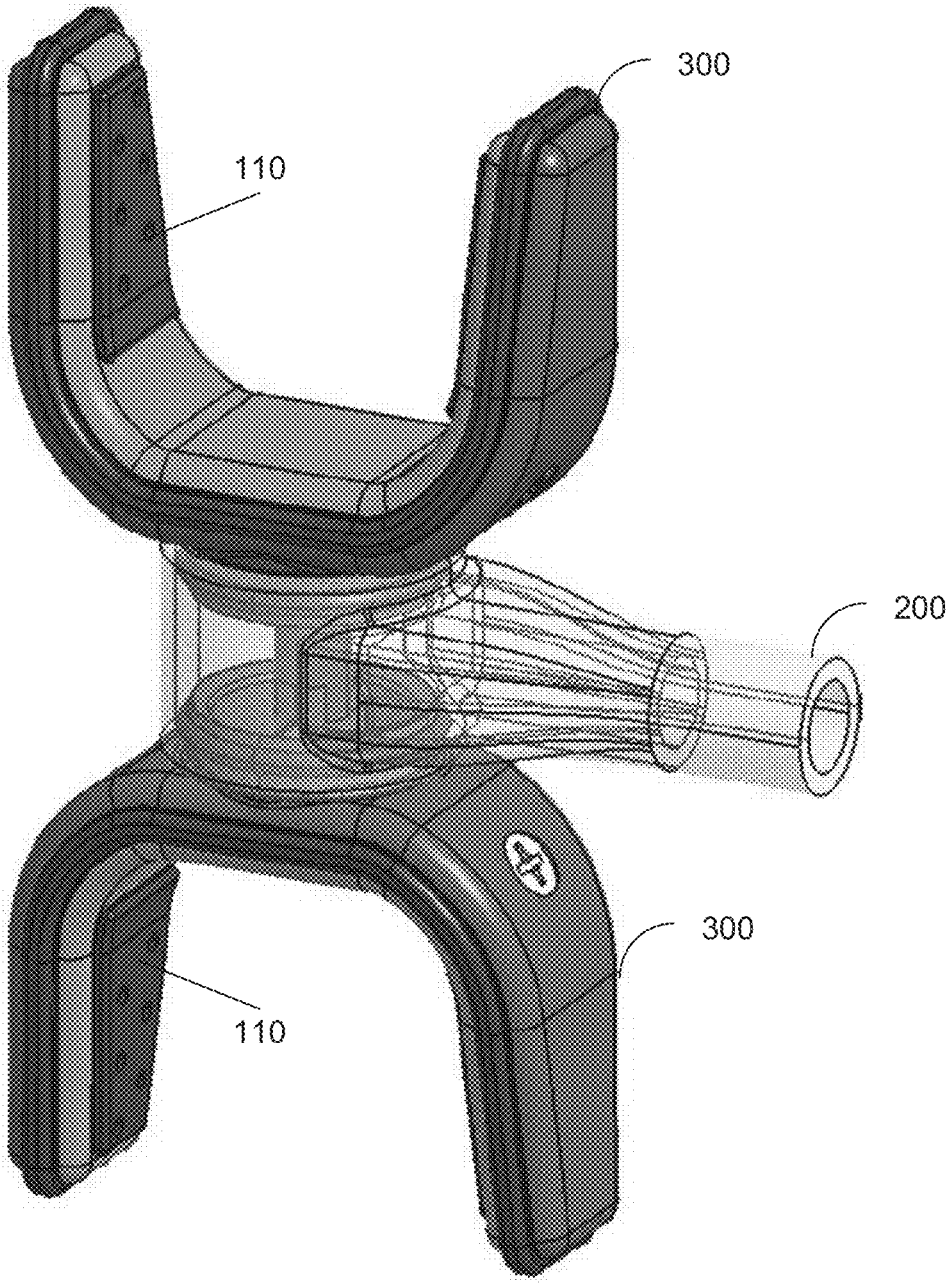

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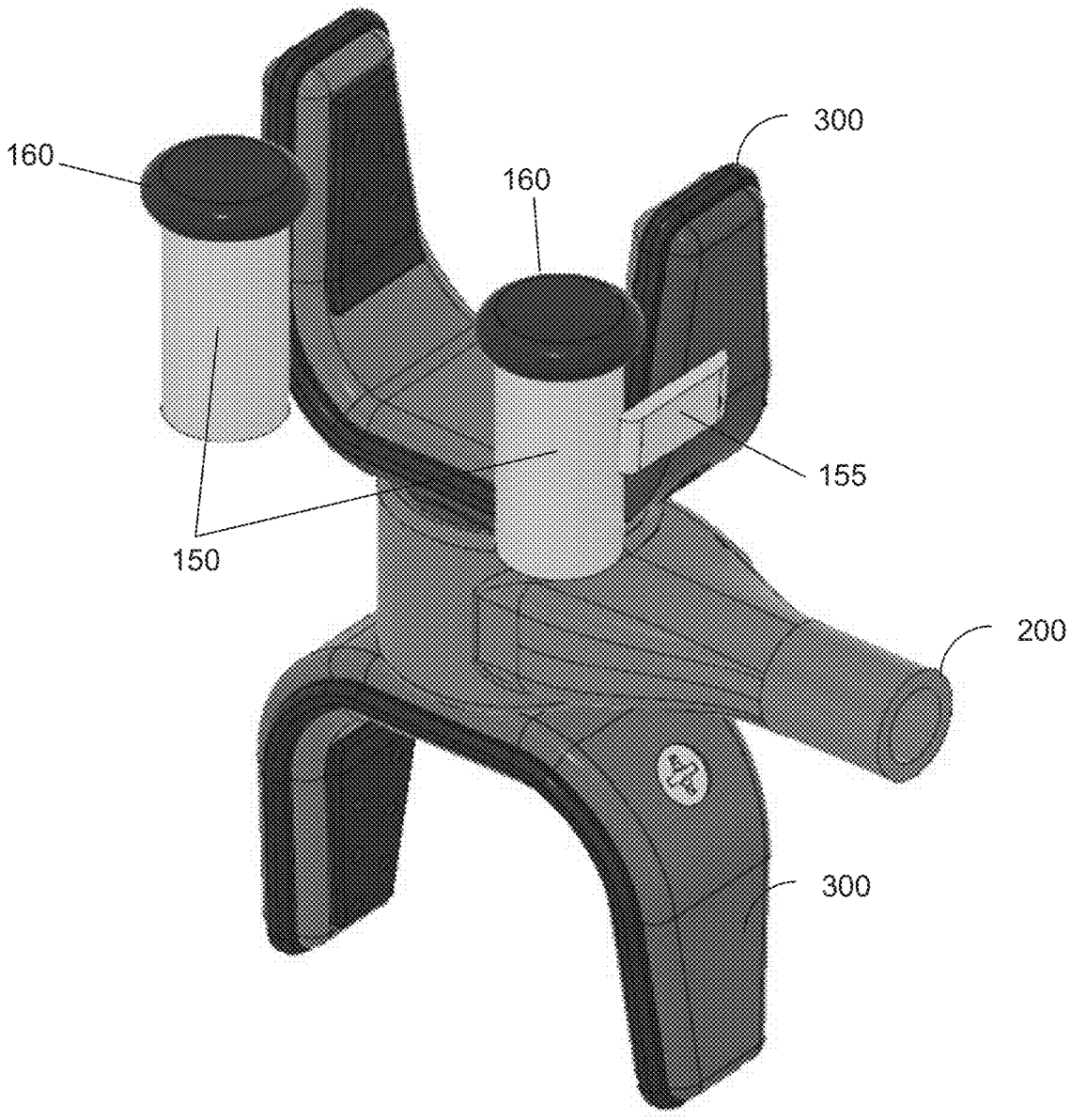

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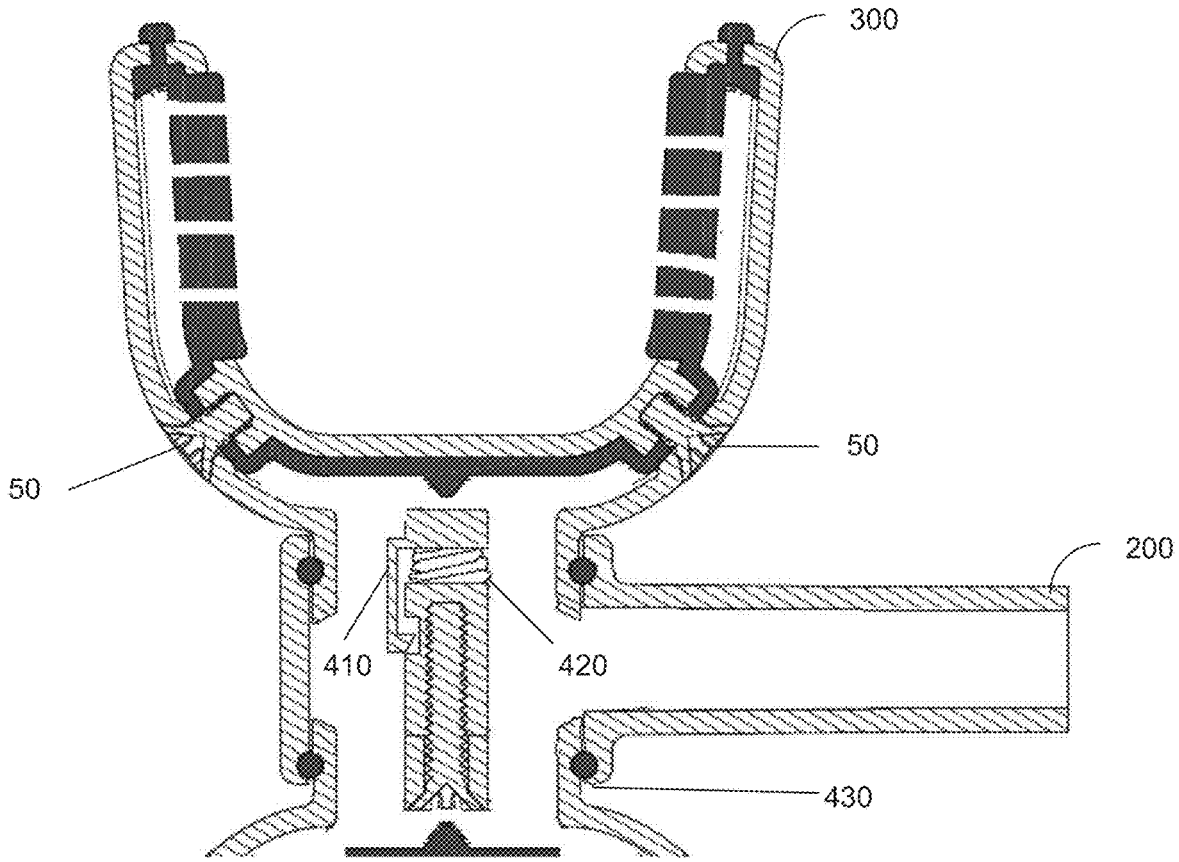
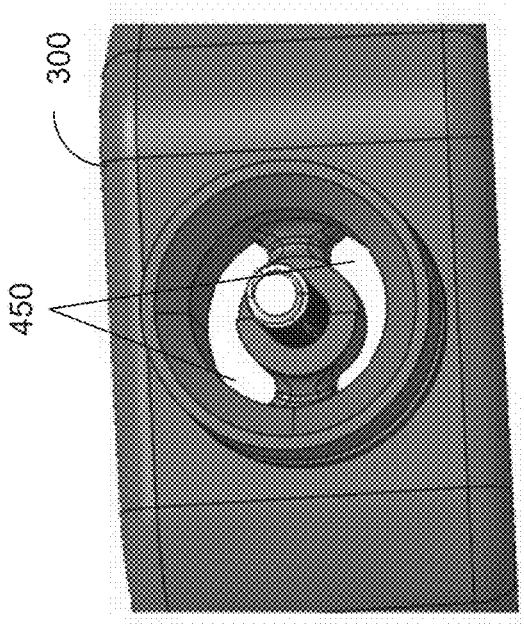
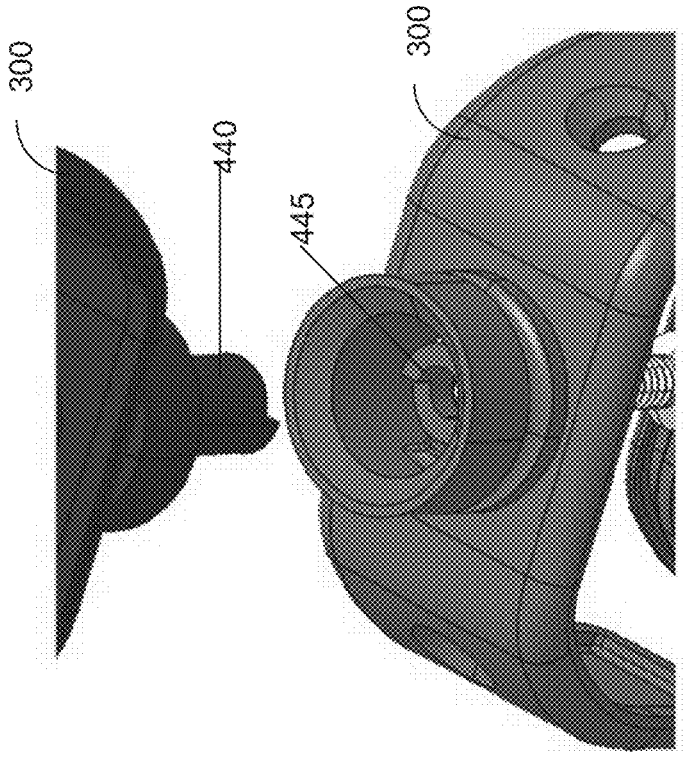


FIG. 8

FIG. 9





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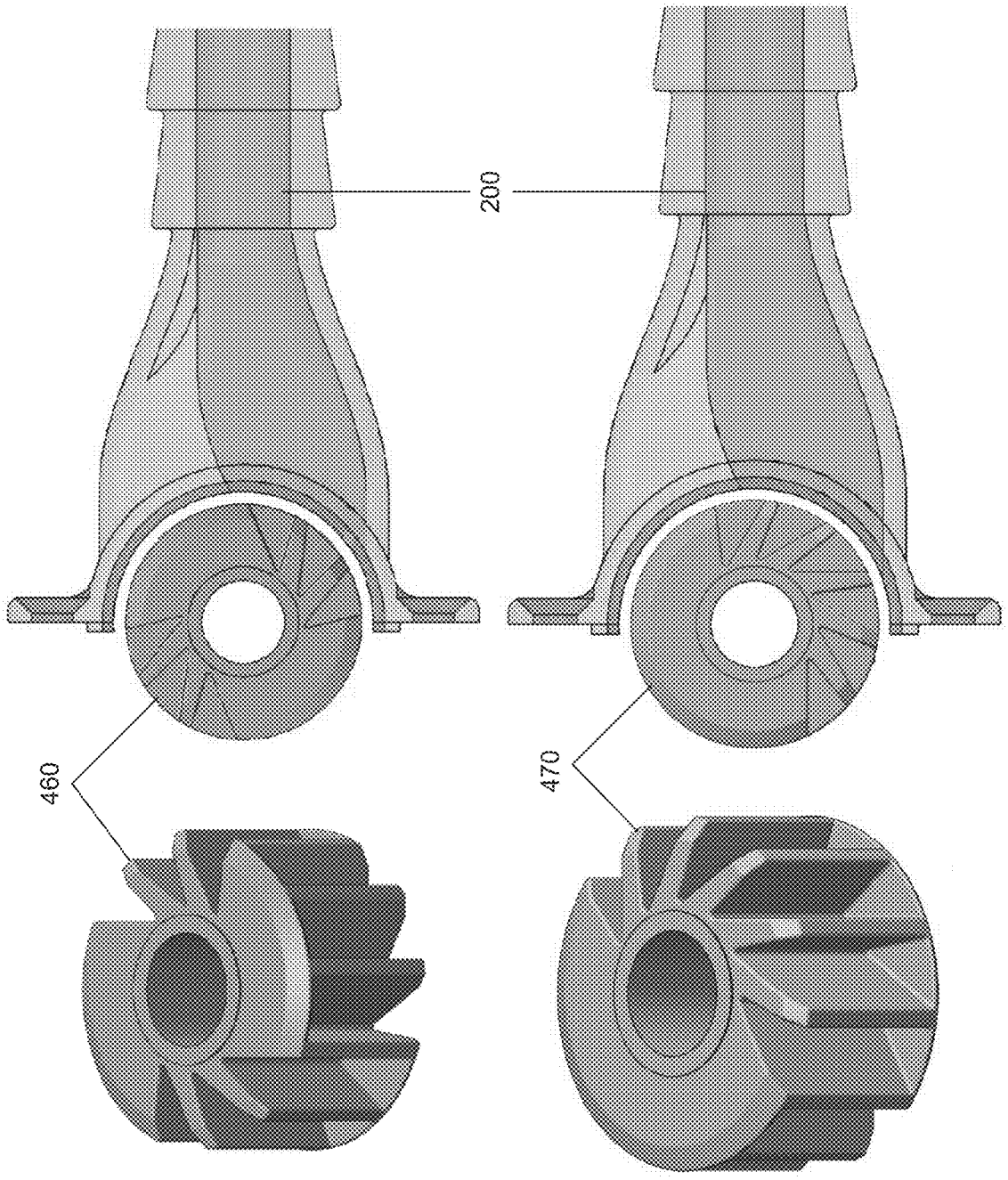

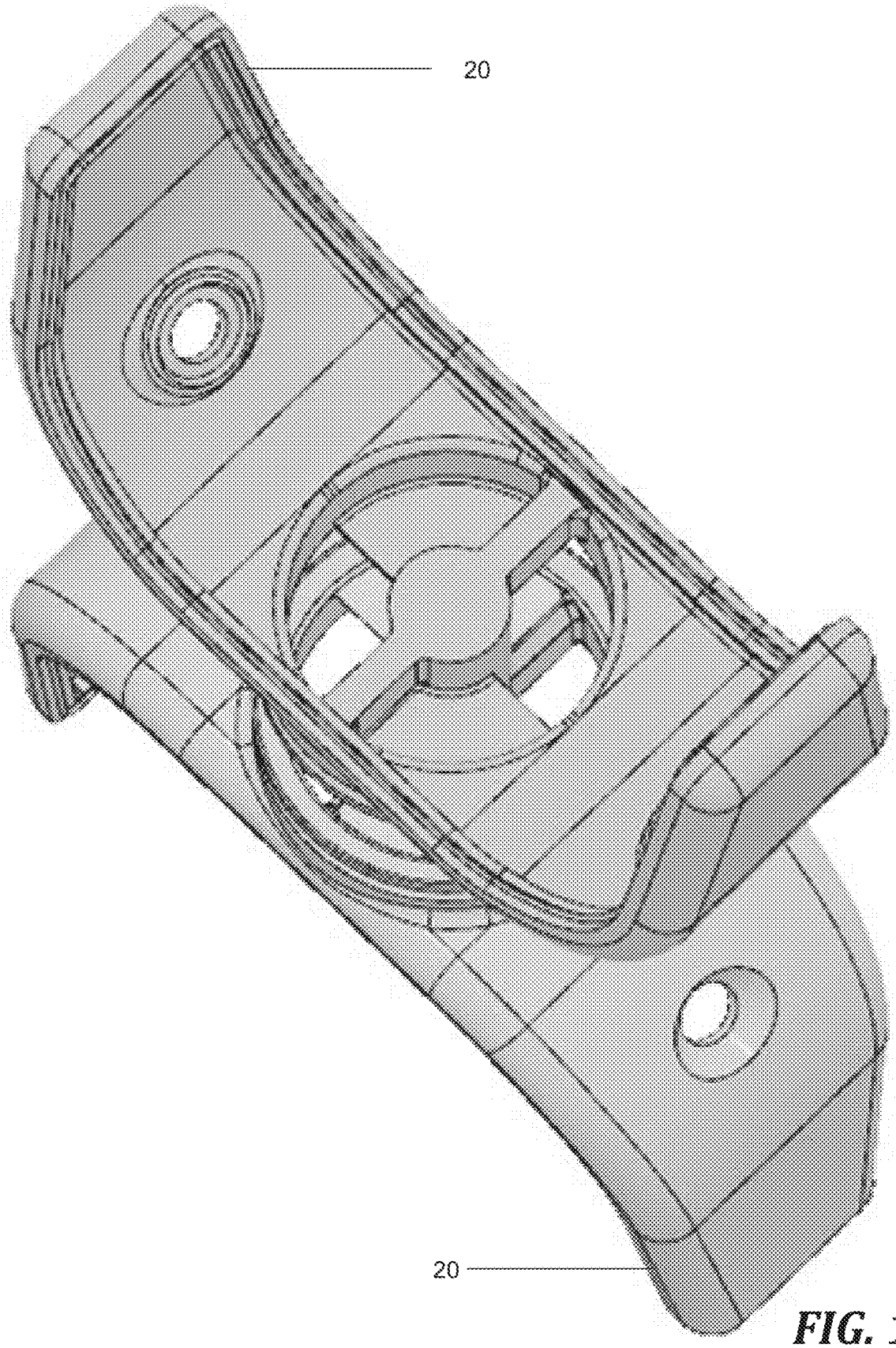

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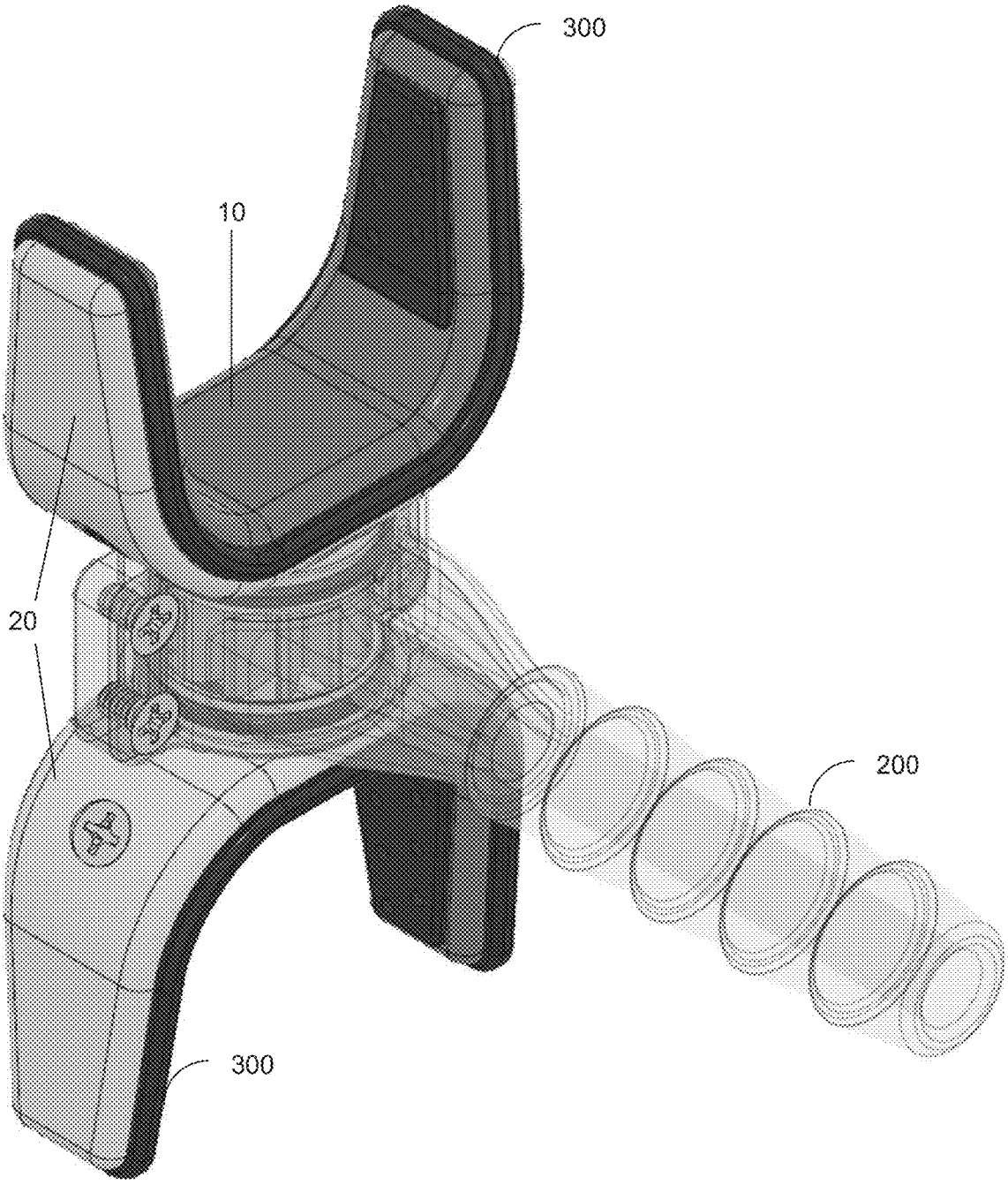

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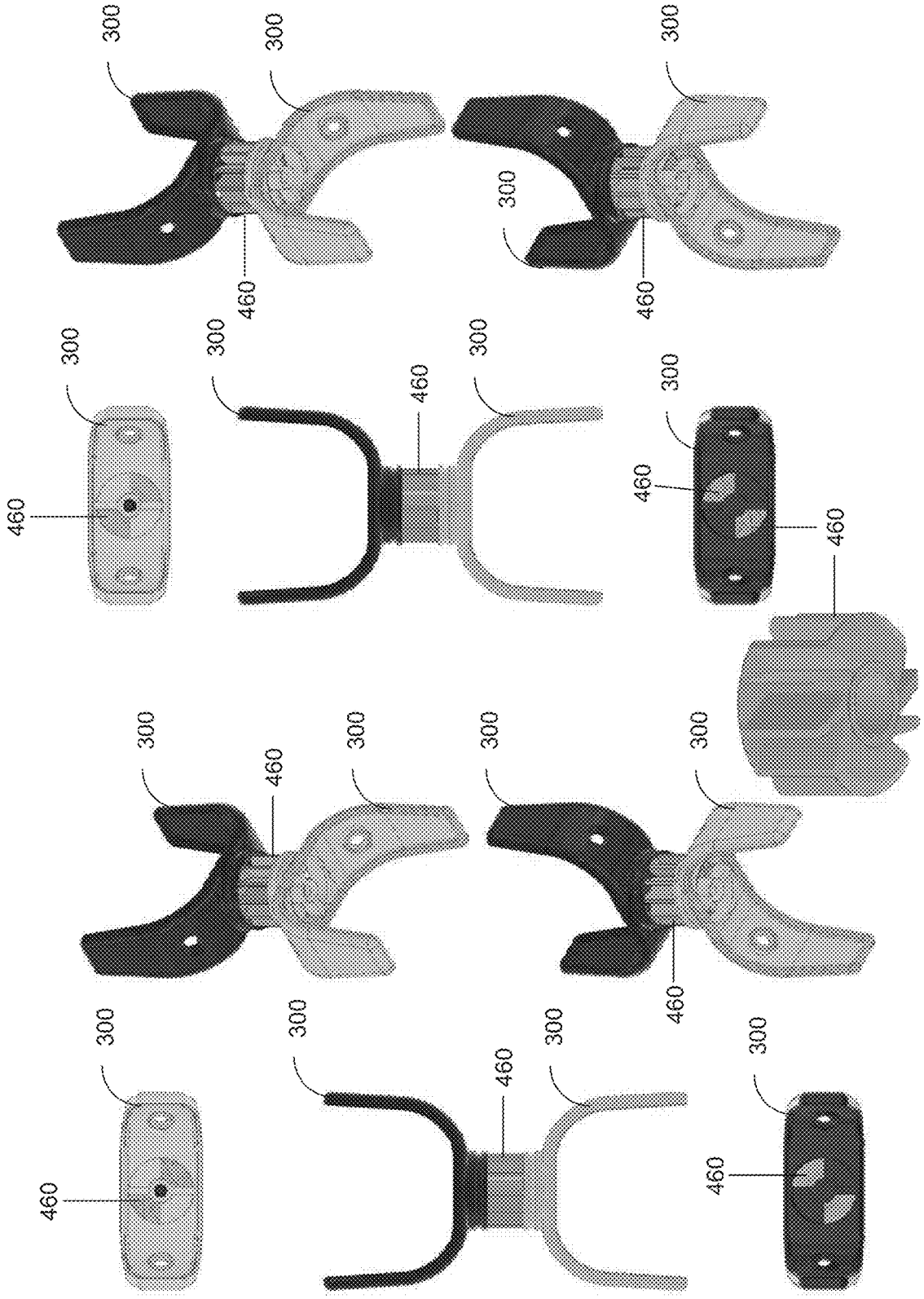


FIG. 13

FIG. 14

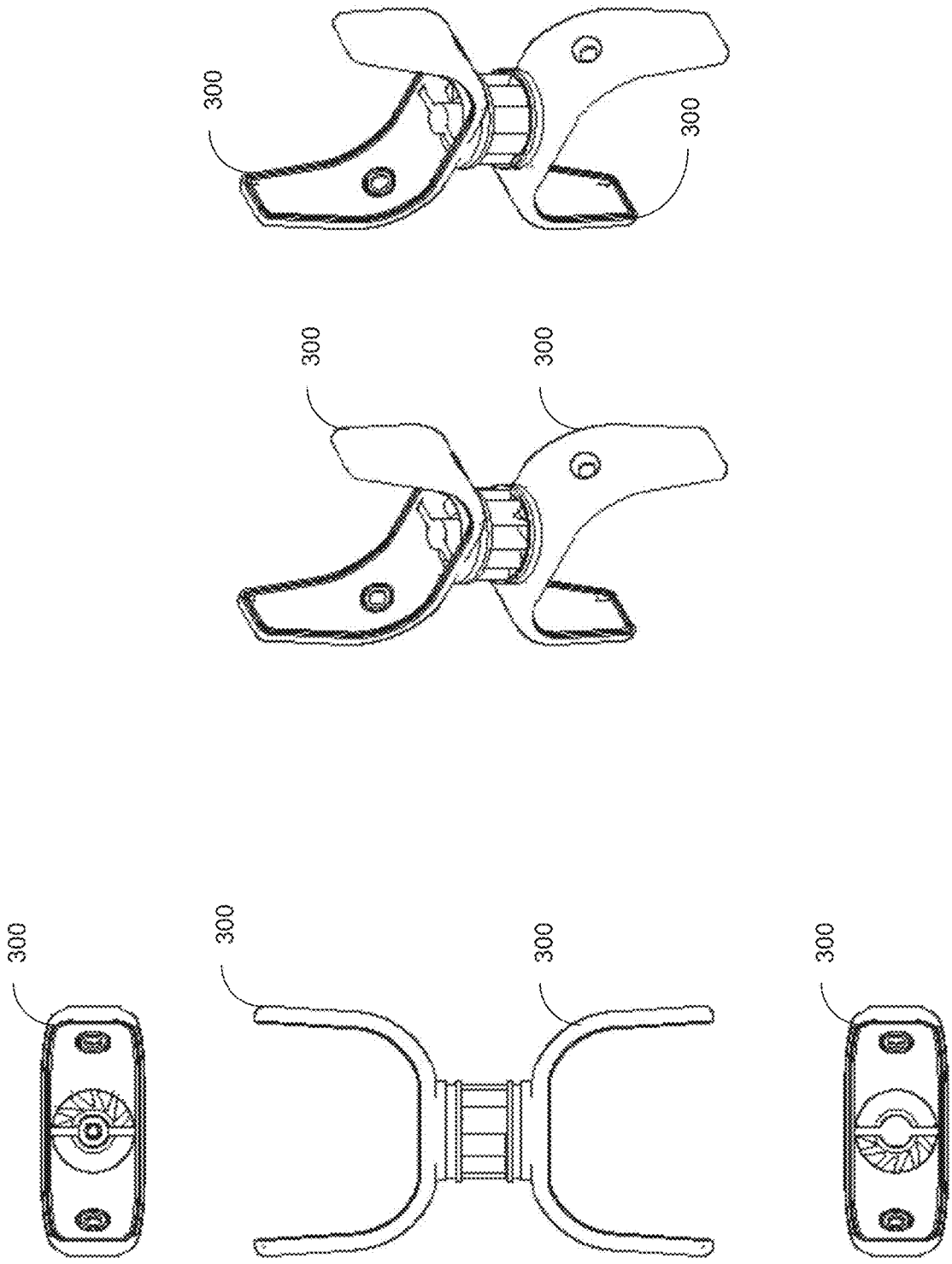
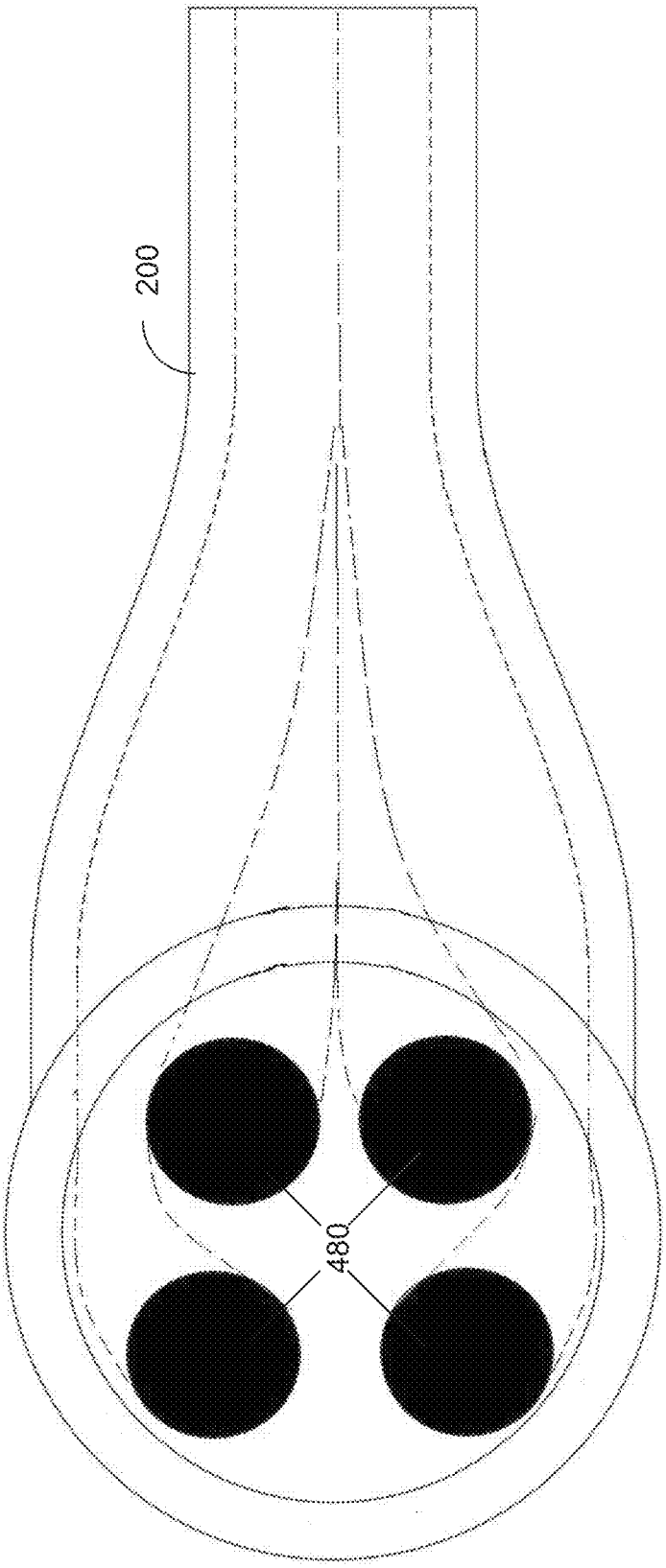


FIG. 15



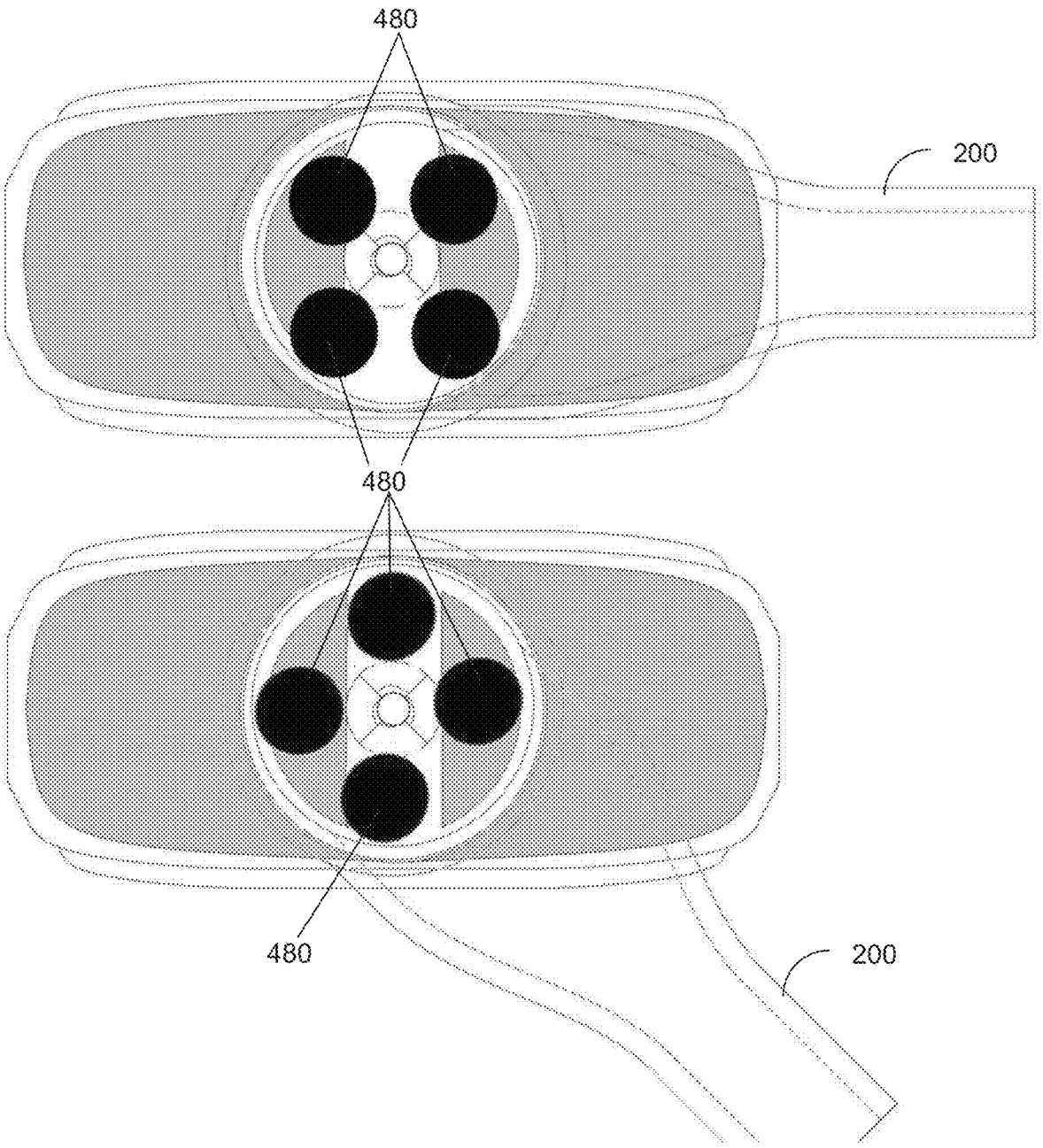
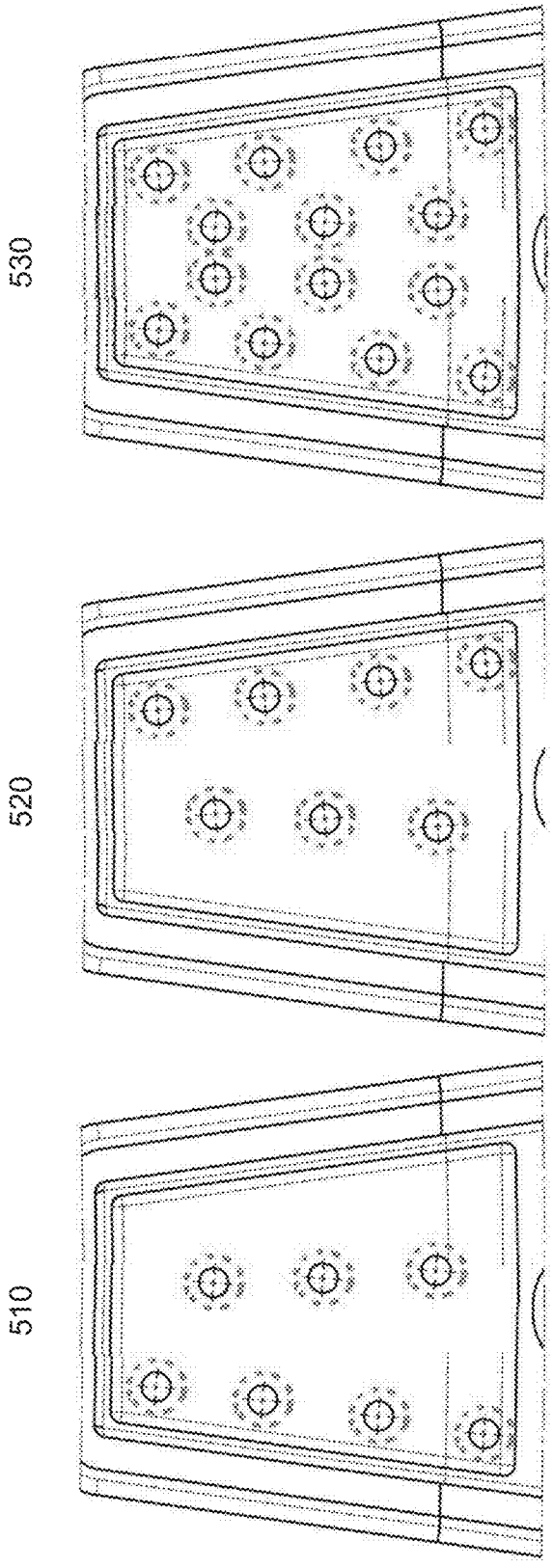


FIG. 16

FIG. 17



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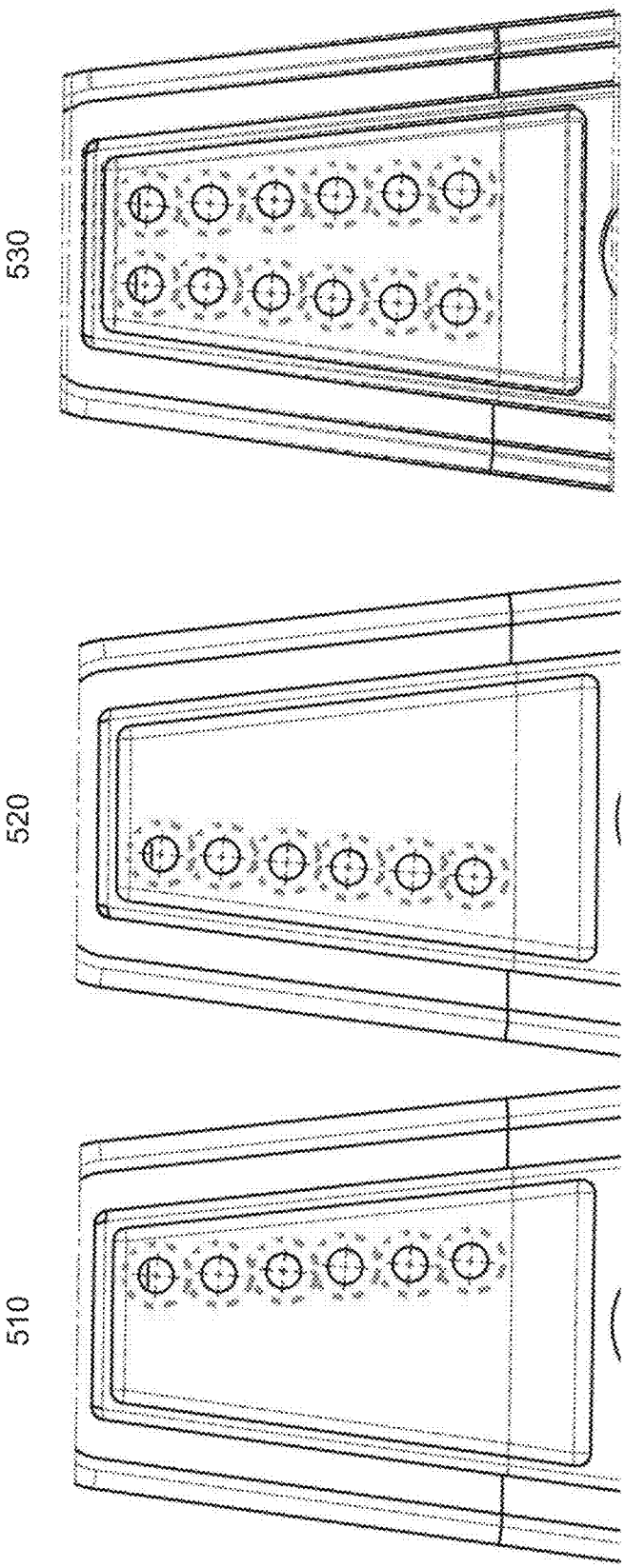


FIG. 19

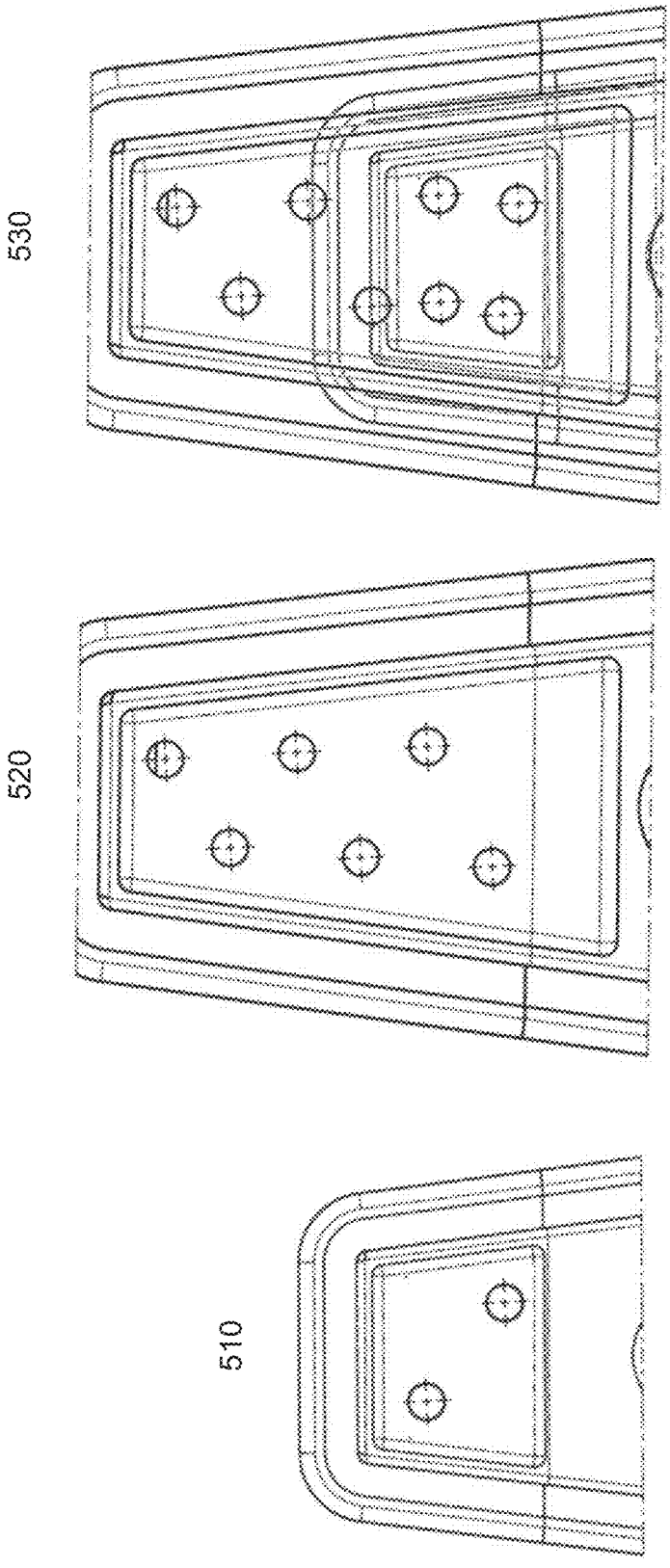
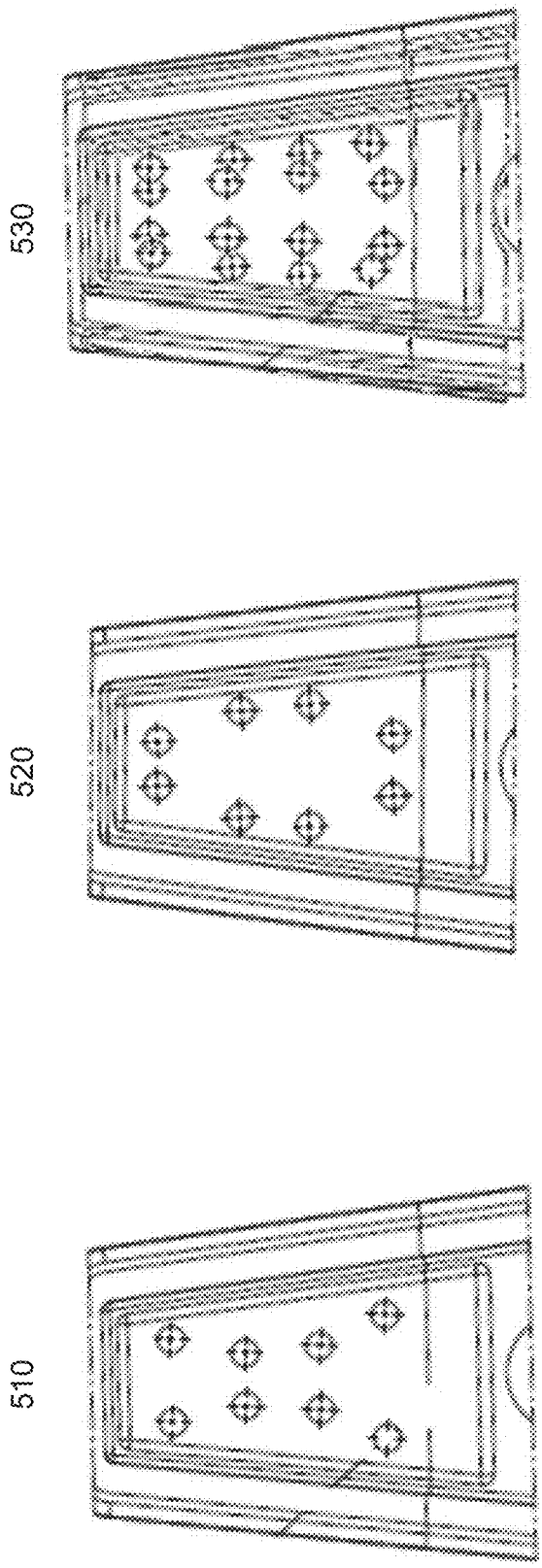


FIG. 20



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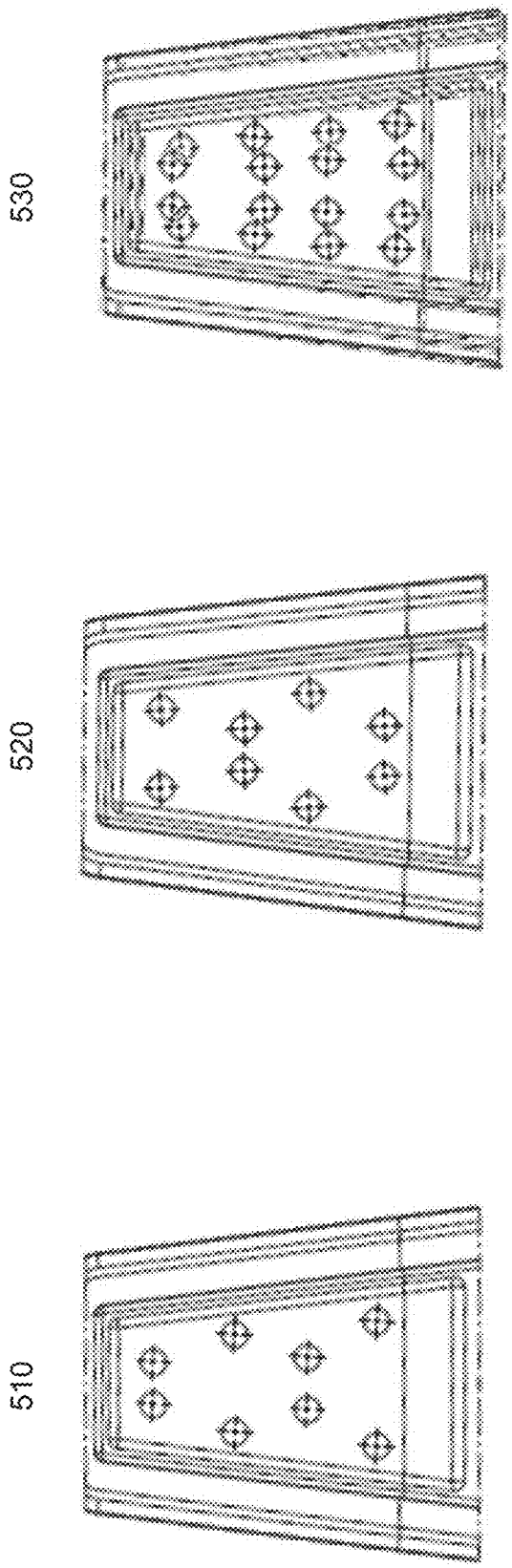

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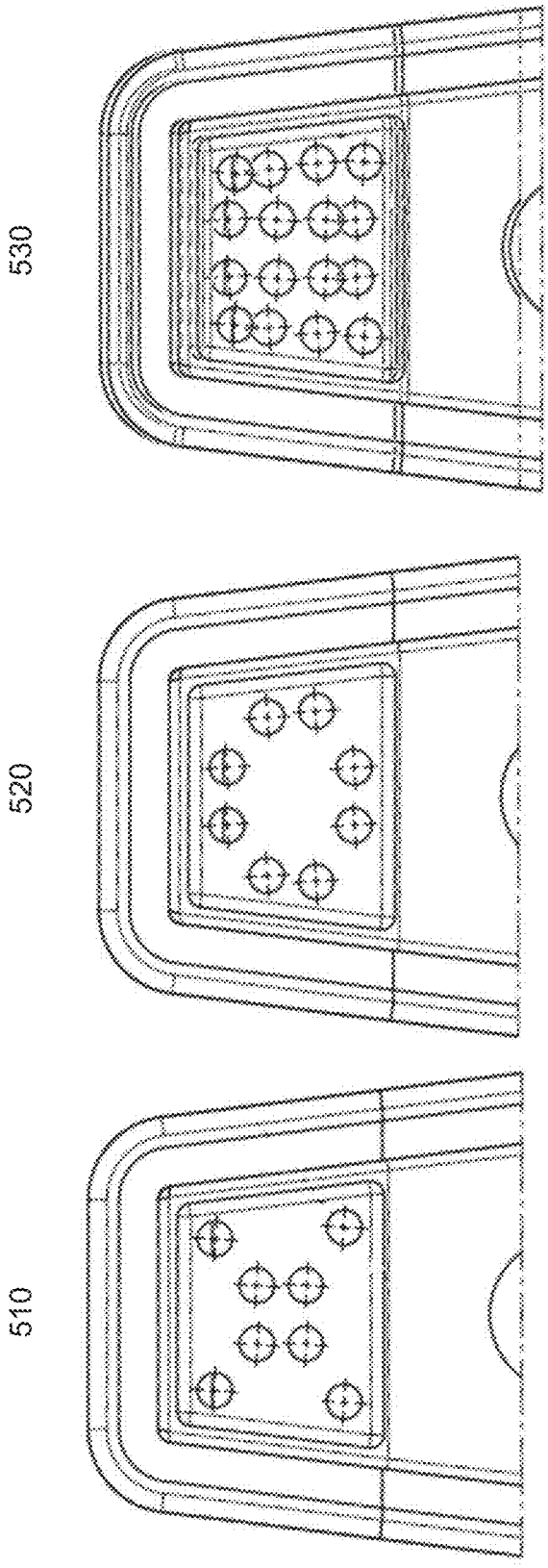

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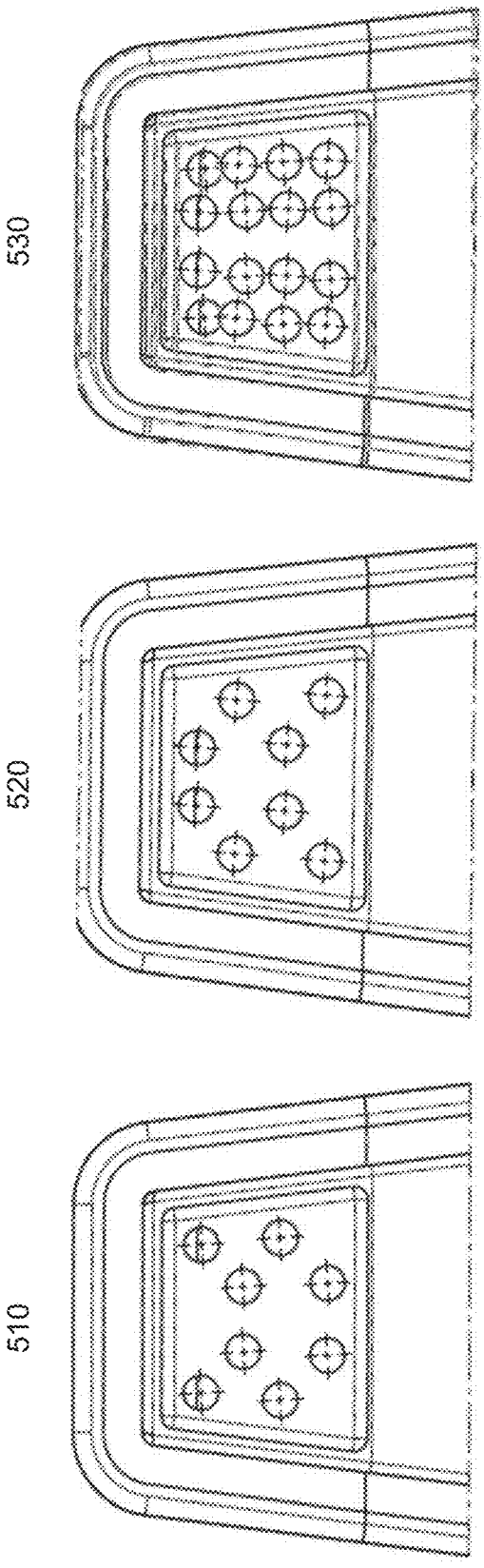


FIG. 24

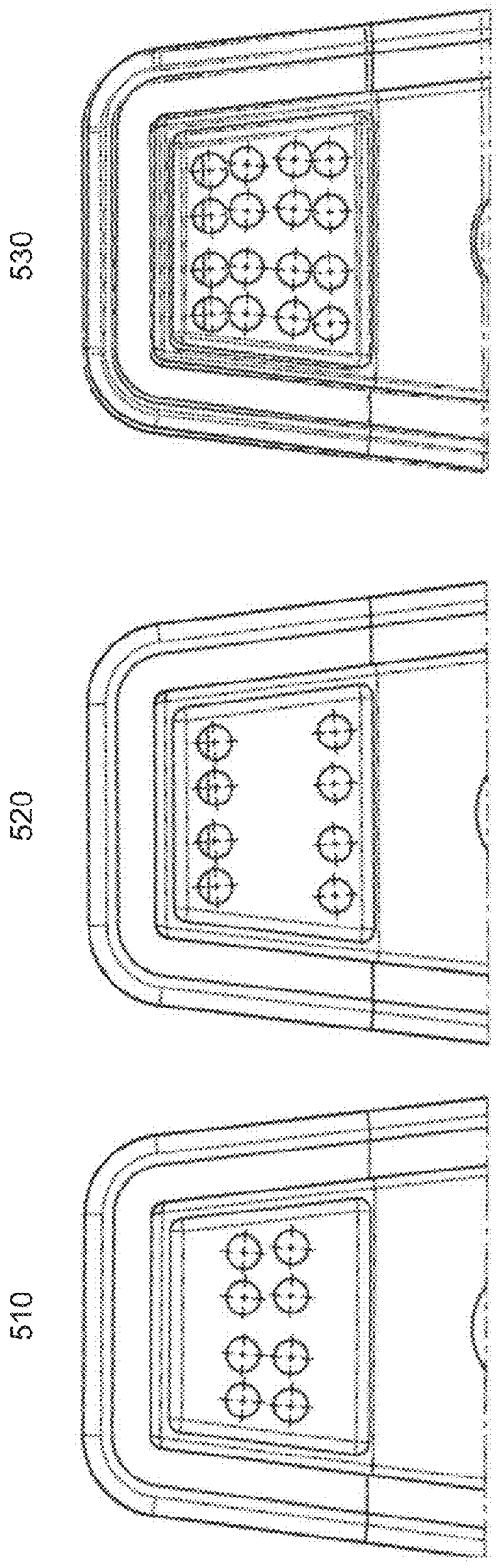
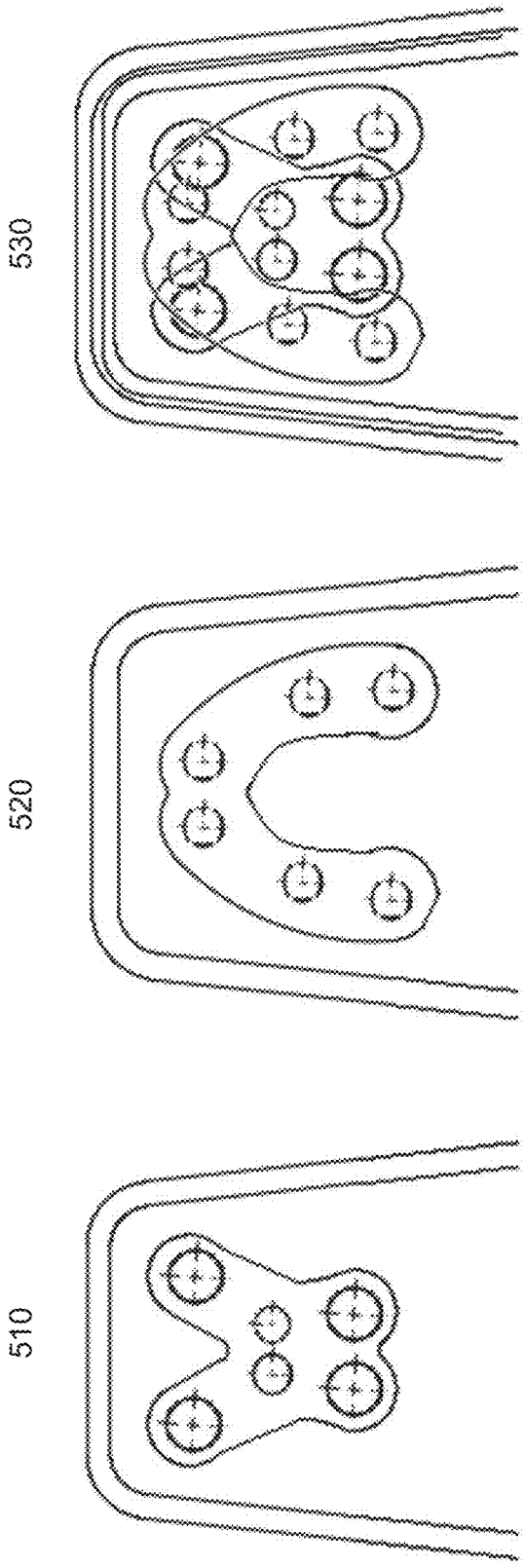


FIG. 25



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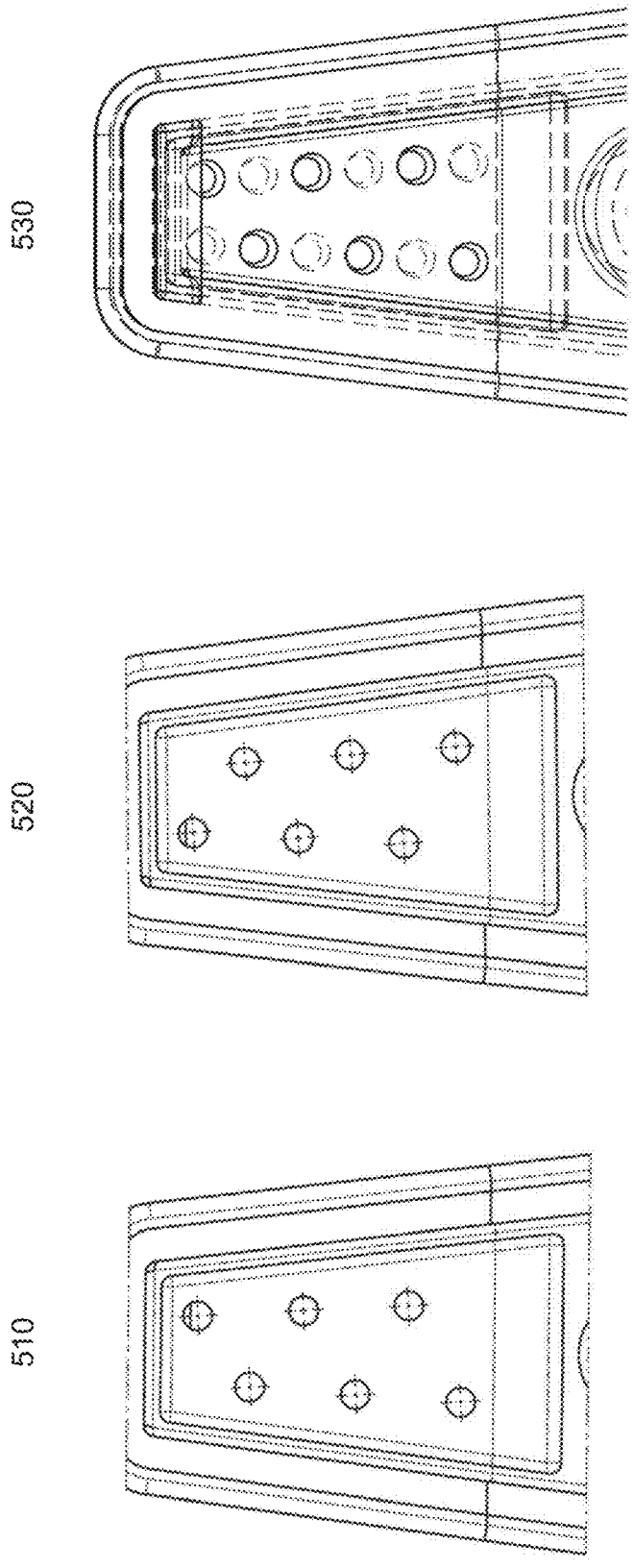

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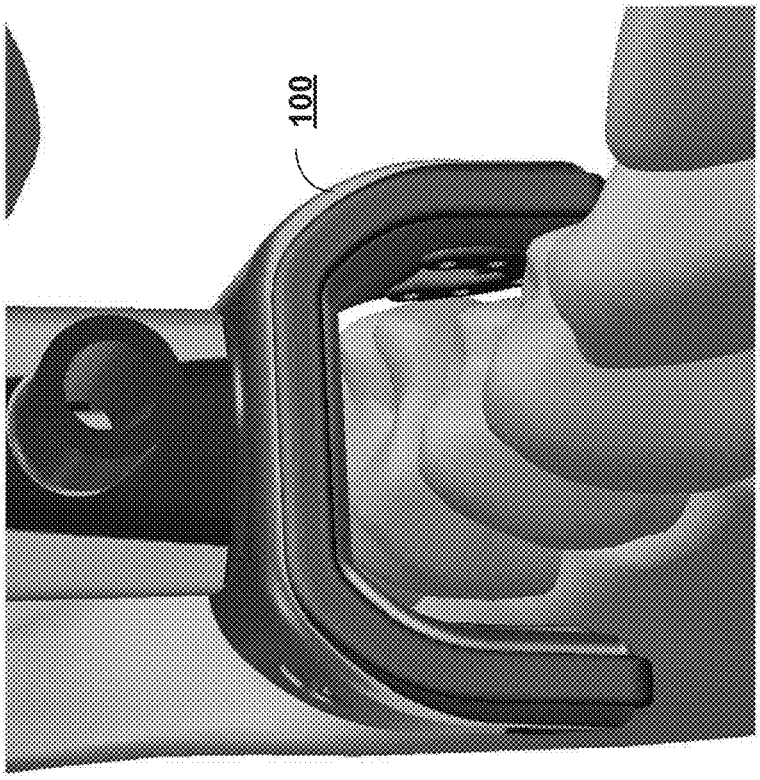

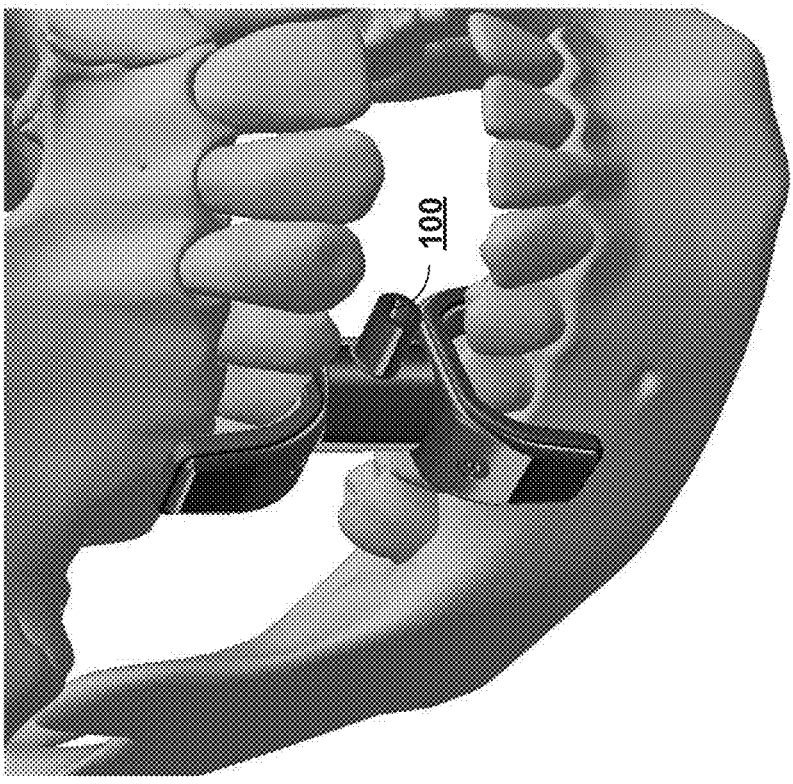

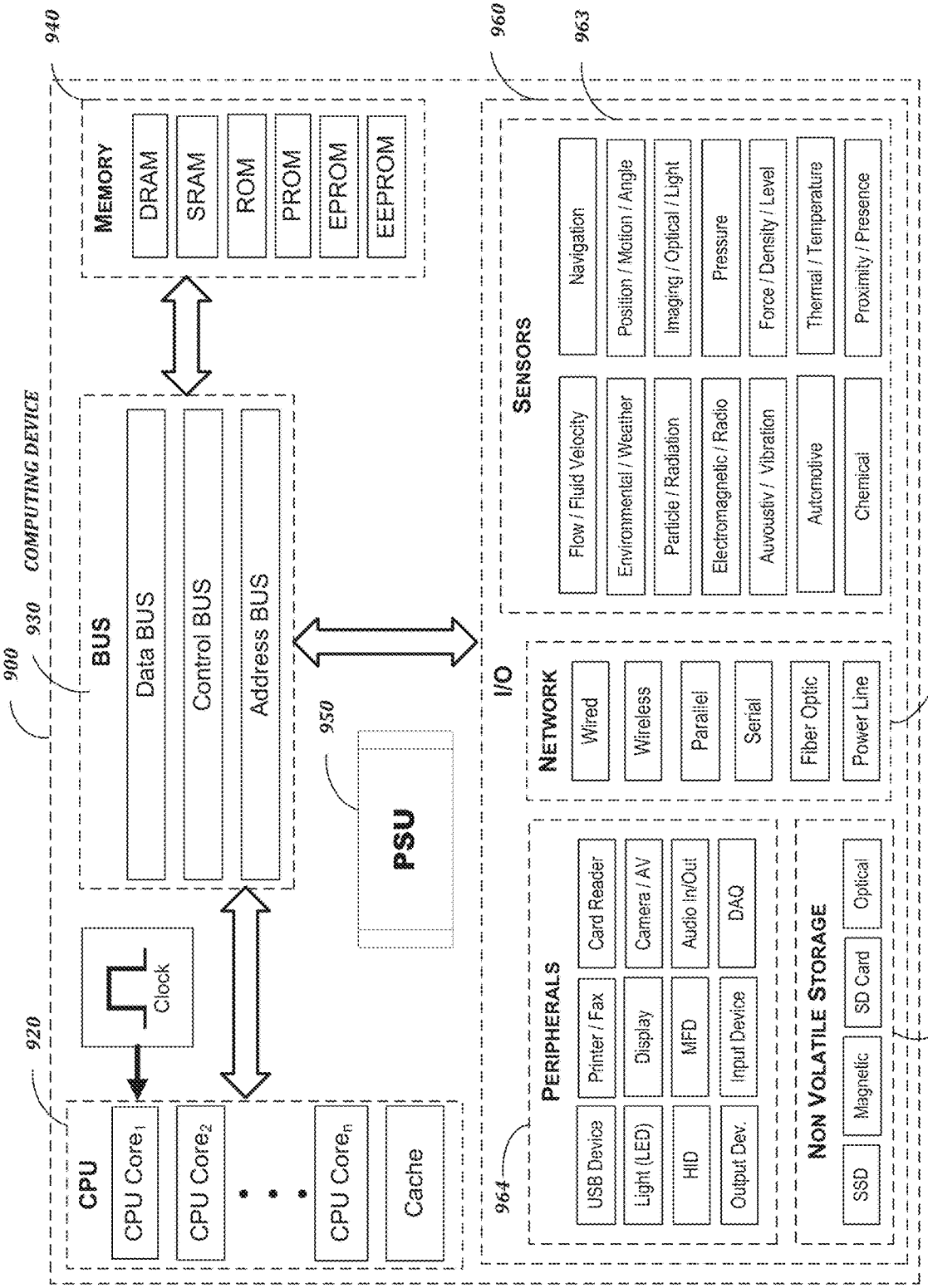
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Data BUS
Control BUS
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PROM
EPROM
EEPROM
950
PSU
960
I/O
963
SENSORS
Navigation
Position / Motion / Angle
Imaging / Optical / Light
Pressure
Force / Density / Level
Thermal / Temperature
Proximity / Presence
Flow / Fluid Velocity
Environmental / Weather
Particle / Radiation
Electromagnetic / Radio
Auvoustiv / Vibration
Automotive
Chemical
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Wireless
Parallel
Serial
Fiber Optic
Power Line
964
PERIPHERALS
USB Device
Printer / Fax
Card Reader
Light (LED)
Display
Camera / AV
HID
MFD
Audio In/Out
Output Dev.
Input Device
DAQ
961
NON VOLATILE STORAGE
SSD
Magnetic
SD Card
Optical

FIG. 28

APPARATUS FOR DENTAL IRRIGATION

RELATED APPLICATIONS

The present application is a U.S. National Stage under 35 U.S.C. § 371 of International Application No. PCT/US2019/017897, filed on Feb. 13, 2019, which claims benefit under the provisions of 35 U.S.C. § 119(e) of U.S. Provisional Application No. 62/629,904, filed on Feb. 13, 2018, and having inventors in common, which are incorporated herein by reference in its entirety. It is intended that the referenced application may be applicable to the concepts and embodiments disclosed herein, even if such concepts and embodiments are disclosed in the referenced application with different limitations and configurations and described using different examples and terminology.

FIELD OF DISCLOSURE

The present disclosure generally relates to dental hygiene methods, systems and devices.

BACKGROUND

Clean teeth and impeccable dental hygiene are important. Good oral and dental hygiene can help prevent bad breath, tooth decay and gum disease, as well as improve overall health. Furthermore, good oral and dental hygiene has been linked to overall physical wellbeing. The conventional strategy is to brush a person's teeth and use dental floss or a toothpick at least twice daily. This often causes problems because the conventional strategy does not allow for pristine dental cleaning to be performed effectively and efficiently. There is a need for a more effective and efficient solution.

BRIEF OVERVIEW

An apparatus for accurate, precise, effective, and convenient dental cleaning and irrigation may be provided by the present disclosure. This brief overview is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This brief overview is not intended to identify key features or essential features of the claimed subject matter. Nor is this brief overview intended to be used to limit the claimed subject matter's scope.

An apparatus for dental irrigation may be provided to project fluid directly onto the surfaces of, and the interproximal spaces between, a user's teeth and gum-line. The apparatus may comprise two hollow U-shaped manifolds having orifices located on their interior faces used as fluid jets. The U-Shaped manifolds may be connected, at a central point of reflection, by a rotating inlet joint which supplies the fluid flow. When placed in the user's mouth, an apparatus consistent with the present disclosure may be designed to receive the top and bottom sets of teeth in each corresponding U-shaped manifold, with orifices configured to provide fluid jets aligned towards the lingual and buccal side of the user's teeth. The orifices may be staggered to provide staggered fluid flow. A user's teeth may be cleaned with a controlled fluid flow by moving the apparatus in a sweeping motion between each set of rear molars.

Still consistent with embodiments of the present disclosure, an apparatus for dental irrigation may comprise:

a first manifold having a first plurality of outlet holes laid out on a first wall of the first manifold and a second wall of the first manifold, wherein the first wall approximately faces the second wall, and wherein the first plurality of outlet holes on the first wall of the first manifold are approximately oriented towards the first plurality of outlet holes on the second wall of the first manifold;

a second manifold having a second plurality of outlet holes laid out on a first wall of the second manifold and a second wall of the second manifold, wherein the first wall approximately faces the second wall, wherein the second plurality of holes on the first wall of the second manifold are approximately oriented towards the second plurality of holes on the second wall of the second manifold, and

wherein the first manifold and the second manifold are positioned so as to approximately:

align with an approximately common axis of symmetry, and

reflect about a central point of reflection, such that each manifold is oriented in opposite directions; and

a rotating inlet joint comprising an inlet channel to receive fluid and channel the fluid into:

the first manifold towards the first plurality of outlet holes, such that the fluid is channeled to be expelled from the first plurality of holes approximately towards the axis of symmetry, and

the second manifold towards the second plurality of outlet holes, such that the fluid is channeled to be expelled from the second plurality of holes approximately towards the axis of symmetry,

wherein the rotating inlet joint is positioned in between the first manifold and the second manifold,

wherein the rotating inlet joint connects to the first manifold at a first inlet portion at approximately a base of the first manifold, and

wherein the rotating inlet joint connects to the second manifold at a second inlet portion at approximately a base of the second manifold,

wherein the inlet channel of the rotating inlet joint protrudes from the rotating inlet joint to form an angle relative to the axis of symmetry, and

wherein the rotating inlet joint is configured to rotate about the axis of symmetry to enable the inlet channel to turn about the axis of symmetry without blocking a flow of fluid from the inlet channel to the first manifold and the second manifold.

In yet further embodiments, an apparatus for dental irrigation designed to project fluid directly onto surfaces of, and interproximal spaces between, a user's teeth and gum-line may be provided. The apparatus may comprise:

a first approximately U-shaped manifold comprising:

a first plurality of outlet holes located on a first interior face of the first U-shaped manifold,

a second plurality of outlet holes located on a second interior face of the first U-shaped manifold, and

a first inlet hole at approximately a base of the first U-shaped manifold,

wherein the first plurality of outlet holes of the first interior face of the first U-shaped manifold are asymmetrically aligned relative to the second plurality of outlet holes on the second interior face of the first U-shaped manifold;

a second approximately U-shaped manifold comprising:

a third plurality of outlet holes located on a first interior face of the second U-shaped manifold,

a fourth plurality of outlet holes located on a second interior face of the second U-shaped manifold, and

a second inlet hole at approximately a base of the second U-shaped manifold,

wherein the third plurality of outlet holes of the first face of the second U-shaped manifold are asymmetrically aligned relative to the fourth plurality of outlet holes on the second interior face of the second U-shaped manifold;

a rotating inlet joint comprising:

an inlet channel to receive fluid,

a first opening to channel the received fluid towards a first inlet hole of the first U-shaped manifold, and

a second opening to channel the received fluid towards the second inlet hole of the second U-shaped manifold,

wherein the first opening and the second opening are oriented in substantially opposite directions, and

wherein the inlet channel is positioned substantially perpendicularly and approximately in between the first opening and the second opening,

wherein the rotating inlet joint connects the first U-shaped manifold and the second U-shaped manifold to form an approximately H-shaped manifold, and

wherein the H-shaped manifold is configured to channel the fluid received from the inlet channel to the first plurality of outlet holes, the second plurality of outlet holes, the third plurality of outlet holes, and the fourth plurality of outlet holes, and

wherein the rotating inlet joint is configured to rotate about an approximately vertical axis of symmetry of the H-shaped manifold to enable the inlet channel to turn about the vertical axis of symmetry without:

altering a position of the first U-shaped manifold and the position of the second U-shaped manifold, and

blocking a flow of the fluid from the inlet channel to the first manifold and the second manifold.

In yet further embodiments, an apparatus for dental irrigation designed to project fluid directly onto surfaces of, and interproximal spaces between, a user's teeth and gum-line may comprise:

a first manifold segment having at least one first inlet and a first plurality of outlet holes;

a second manifold segment having at least one second inlet and a second plurality of outlet holes; and

a rotating inlet segment comprising an inlet channel to receive fluid and channel the fluid into the first manifold through the at least one first inlet and into the second manifold through the at least one second inlet,

wherein the rotating inlet segment, first manifold segment, and the second manifold are positioned so as to approximately:

align with an approximately central vertical axis of symmetry, and

reflect about an approximately central horizontal axis of symmetry, such that the first manifold and the second manifold are positioned at opposite sides of the rotating inlet segment and are oriented in opposite directions; and

wherein the rotating inlet segment is configured to rotate about the axis of common symmetry to enable the inlet channel to turn about the axis of symmetry,

wherein an angle of the rotating inlet segment impacts a property of the fluid flow to the user's teeth, the angle being relative to at least one of the following: the vertical axis of symmetry and the horizontal axis of symmetry.

Both the foregoing brief overview and the following detailed description provide examples and are explanatory only. Accordingly, the foregoing brief overview and the following detailed description should not be considered to be restrictive. Further, features or variations may be provided in addition to those set forth herein. For example, embodiments may be directed to various feature combinations and sub-combinations described in the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate various embodiments of the present disclosure. The drawings contain representations of various trademarks and copyrights owned by the Applicants. In addition, the drawings may contain other marks owned by third parties and are being used for illustrative purposes only. All rights to various trademarks and copyrights represented herein, except those belonging to their respective owners, are vested in and the property of the Applicants. The Applicants retain and reserve all rights in their trademarks and copyrights included herein, and grant permission to reproduce the material only in connection with reproduction of the granted patent and for no other purpose.

Furthermore, the drawings may contain text or captions that may explain certain embodiments of the present disclosure. This text is included for illustrative, non-limiting, explanatory purposes of certain embodiments detailed in the present disclosure. In the drawings:

FIG. **1** illustrates a general overview of an apparatus assembly consistent with the present disclosure, broken down into individual components;

FIG. **2** illustrates an embodiment of the apparatus consistent with the present disclosure, that contains protruding pads on the membrane layer and uses no O-rings **60**;

FIG. **3** illustrates an embodiment of the apparatus, consistent with the present disclosure, that contains non-protruding outlet holes on the inner shell and uses two sets of O-rings;

FIG. **4** illustrates an embodiment of the apparatus, consistent with the present disclosure, that contains protruding outlet holes on the membrane layer, uses one set of O-rings, and provides fluid flow channels on the membrane layer;

FIG. **5** illustrates an embodiment of the apparatus with different heights for the buccal and lingual sides that is consistent with the present disclosure;

FIG. **6** illustrates an isometric view of the apparatus consistent with the present disclosure with protruding pads on the membrane layer and a translucent/transparent inlet joint;

FIG. **7** illustrates an embodiment of the apparatus consistent with the present disclosure, with motors mounted on one side of the apparatus via sprung supports and soft wheels to drag the apparatus by applying force to the gumline;

FIG. **8** illustrates a cutaway view of the apparatus consistent with various embodiments of the present disclosure, with an internal spring that allows motion between upper and lower parts of the apparatus, therefore providing height adjustment for fluid jet alignment and enhanced comfort;

FIG. **9** illustrates an anti-rotate feature internal attachment that prevents misalignment of the upper and lower U-shaped manifolds, as well as the fluid flow openings on the lower section of the U-shaped manifolds, both consistent with various embodiments of the present disclosure;

FIG. **10** illustrates two embodiments of a rotator wheel that directs alternating fluid flow for the apparatus consistent with various embodiments of the present disclosure;

FIG. **11** illustrates the outer shell of the top manifold, and the outer shell for the bottom manifold, consistent with the present disclosure, wherein the openings for fluid flow on both outer shells line up;

FIG. **12** illustrates an embodiment of the apparatus with a rotator wheel and translucent/transparent rotating inlet joint;

FIG. **13** illustrates an embodiment of the apparatus with the rotator wheel, where the fluid flow alternates between lower and upper teeth;

FIG. **14** illustrates an embodiment of the apparatus with the rotator wheel where the fluid flow alternates between buccal and lingual sides of teeth;

FIG. **15** illustrates an embodiment of the rotating inlet joint designed with four individual fluid channels;

FIG. **16** illustrates different positions of the rotating inlet joint and how the rotation alters fluid flow within the apparatus consistent with various embodiments of the present disclosure;

FIG. **17** illustrates one example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **18** illustrates another example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **19** illustrates an example of non-intersecting fluid jet positions for the apparatus with different buccal and lingual side heights;

FIG. **20** illustrates yet another example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **21** illustrates an alternative example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **22** illustrates another alternative example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **23** illustrates yet another alternative non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **24** illustrates yet another example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **25** illustrates yet another example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **26** illustrates yet another example of non-intersecting fluid jet positions for the apparatus consistent with various embodiments of the present disclosure;

FIG. **27** illustrates an embodiment of the apparatus consistent with various embodiments of the present disclosure in relation to a typical jaw; and

FIG. **28** illustrates a block diagram of a system including a computing device compatible with the various embodiments of the present disclosure.

DETAILED DESCRIPTION

As a preliminary matter, it will readily be understood by a person having ordinary skill in the relevant art that the present disclosure has broad utility and application. As should be understood, any embodiment may incorporate only one or a plurality of the above-disclosed aspects of the disclosure and may further incorporate only one or a plurality of the above-disclosed features. Furthermore, any embodiment discussed and identified as being "preferred" is considered to be part of a best mode contemplated for carrying out the embodiments of the present disclosure. Other embodiments also may be discussed for additional illustrative purposes in providing a full and enabling disclosure. Moreover, many embodiments, such as adaptations, variations, modifications, and equivalent arrangements, will be implicitly disclosed by the embodiments described herein and fall within the scope of the present disclosure.

The detailed disclosure herein of one or more embodiments is not intended, nor is to be construed, to limit the scope of patent protection afforded in any claim of a patent issuing here from, which scope is to be defined by the claims and the equivalents thereof It is not intended that the scope of patent protection be defined by reading into any claim a limitation found herein that does not explicitly appear in the claim itself.

Thus, for example, any sequence(s) and/or temporal order of steps of various processes or methods that are described herein are illustrative and not restrictive. Accordingly, it should be understood that, although steps of various processes or methods may be shown and described as being in a sequence or temporal order, the steps of any such processes or methods are not limited to being carried out in any particular sequence or order, absent an indication otherwise. Indeed, the steps in such processes or methods generally may be carried out in various different sequences and orders while still falling within the scope of the present invention. Accordingly, it is intended that the scope of patent protection is to be defined by the issued claim(s) rather than the description set forth herein.

Additionally, it is important to note that each term used herein refers to that which an ordinary artisan would understand such term to mean based on the contextual use of such term herein. To the extent that the meaning of a term used herein—as understood by the ordinary artisan based on the contextual use of such term—differs in any way from any particular dictionary definition of such term, it is intended that the meaning of the term as understood by the ordinary artisan should prevail.

Regarding applicability of 35 U.S.C. § 112, ¶6, no claim element is intended to be read in accordance with this statutory provision unless the explicit phrase "means for" or "step for" is actually used in such claim element, whereupon this statutory provision is intended to apply in the interpretation of such claim element.

Furthermore, it is important to note that, as used herein, "a" and "an" each generally denotes "at least one," but does not exclude a plurality unless the contextual use dictates otherwise. When used herein to join a list of items, "or" denotes "at least one of the items," but does not exclude a plurality of items of the list. Finally, when used herein to join a list of items, "and" denotes "all of the items of the list."

The following detailed description refers to the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the following description to refer to the same or similar elements. While many embodiments of the disclosure may be described, modifications, adaptations, and other implementations are possible. For example, substitutions, additions, or modifications may be made to the elements illustrated in the drawings, and the methods described herein may be modified by substituting, reordering, or adding stages to the disclosed methods. Accordingly, the following detailed description does not limit the disclosure. Instead, the proper scope of the disclosure is defined by the appended claims. The present disclosure contains headers. It should be understood that these headers are used as references and are not to be construed as limiting upon the subject matter disclosed under the header.

The present disclosure includes many aspects and features. Moreover, while many aspects and features relate to, and are described in, the context of dental hygiene, embodiments of the present disclosure are not limited to use only in this context.

Consistent with embodiments of the present disclosure, an apparatus for accurate, efficient, and convenient dental cleaning and irrigation may be provided. This overview is provided to introduce a selection of concepts in a simplified form that are further described below. This overview is not intended to identify key features or essential features of the claimed subject matter. Nor is this overview intended to be used to limit the claimed subject matter's scope. The apparatus for accurate, efficient, and convenient dental cleaning and irrigation may be used by individuals, dental practitioners, and/or companies to perform dental irrigation, improve dental hygiene, clean teeth, remove plaque, massage gums, kill bacteria and monitor dental state.

Both the foregoing overview and the following detailed description provide examples that are only used for illustrative purposes. Accordingly, the foregoing overview and the ensuing detailed description should not be considered to be restrictive. Further, features or variations may be provided in addition to those set forth herein. For example, embodiments may be directed to various feature combinations and sub-combinations described herein.

Although the stages and/or components and components illustrated by the figures are disclosed in a particular order, it should be understood that the order is disclosed for illustrative purposes only. Stages and/or components may be combined, separated, reordered, and various intermediary stages and/or components may exist. Accordingly, it should be understood that the various stages and/or components illustrated within the flow chart may be, in various embodiments, performed in arrangements that differ from the ones illustrated. Moreover, various stages and/or components may be added or removed from the figures without altering or deterring from the fundamental scope of the depicted methods and systems disclosed herein. Ways to implement the stages and/or components of the apparatus will be described in greater detail below.

I. Overview

An apparatus consistent with embodiments of the present disclosure may be designed such that a controlled pressure flow of fluid is directly projected onto teeth surfaces, interproximal spaces, and gum line of a user's mouth. The apparatus may comprise two hollow manifold components having holes located on the interior faces of each manifold, and a rotating inlet joint attaching the two manifolds at a central point of reflection. The manifolds may be in a variety of different geometric configurations, such as, but not limited to, U-shaped, parabolic, or rectangular. In embodiments disclosing a parabolic shape, the term parabolic may be taken to mean that the shape of the interior face of the manifold can be approximated with an even order polynomial function.

For illustrative purposes, the manifold may be described herein as a U-shaped manifold. Each U-shaped manifold may be embodied such that it fits around a user's corresponding upper and lower teeth. Although various embodiment disclosed herein mention a symmetrical configuration for the apparatus, and each corresponding manifold, it should be understood that symmetry may only be approximate, and that the configuration of the manifolds and apparatus may be ergonomically designed to fit into a user's mouth, which includes asymmetry from the buccal to lingual sides, and design accommodations for overbite and/or underbite.

Furthermore, some embodiments of the manifold **300** consistent with the present disclosure may comprise a different component, as well as different number of components. For example, the manifold **300** may comprise a single piece mold or the inner shell **10** and outer shell **20** without a membrane layer **30**. Moreover, although embodiments herein describe two manifolds configured together, it should be understood that the apparatus may be comprised of a single part or construction.

Accordingly, the break-down of the apparatus into parts is provided for illustrative purposes and contemplate a single part construction.

The apparatus may provide fluid jets aligned towards the lingual and buccal side of the user's teeth for staggered fluid flow. A user's teeth may be cleaned by moving the apparatus over the teeth in a sweeping manner such that a sweep of the manifold from one rear molar to the other will ensure all of the gum line and every interproximal space is cleaned with the aforementioned fluid jets.

It should be understood that the present specification and figures disclose only some embodiments of the apparatus, and that other embodiments of the apparatus consistent with the present disclosure may be anticipated with the present disclosure. Varying embodiments of the apparatus could have varying components, as well as a varying number and combination of components.

FIG. **1** illustrates an apparatus consistent with the present disclosure, broken down into individual components. The apparatus may comprise two hollow U-shaped manifolds **300**, wherein each parabolic or U-shaped manifold **300** may comprise inner shell **10** and outer shell **20**, with soft membrane layer **30** sandwiched in between the two shells. The components may be combined using various means, including, for example, but not limited to, being clipped together and/or be mounted together by short screws **50**. Each U-shaped manifold may comprise an inlet to receive fluid into its hollow layer.

The inlet may be positioned at approximately the vertex of the U-shaped **300**.

The inner shell **10** may have cutouts or holes (hereinafter referred to as "holes") on each side. The holes may be enabled to provide for jets of fluid to exit the apparatus **100** and projected onto a user's teeth. The two U-shaped manifolds **300** may be connected together by a rotating inlet joint **200**. The connection may provide for a symmetrical, approximately H-shaped manifold. The connection of the three components (two U-shaped manifolds and the rotating inlet joint) may be connected by various means, including, for example, but not limited to, being snapped together and/or attached by a longer screw **55**.

In some embodiments, to prevent fluid leakage, an enhanced seal may be provided by using one or more O-rings **60** between the rotating inlet joint **200** and each outer shell **20**. Alternately, the seal may be accomplished by precision molding, or other means without the use of O-rings **60**. The fluid may enter through an inlet channel of the rotating inlet joint **200**, and then channeled to each U-shaped manifold **300** through their corresponding inlet openings in the outer shell **20**. The fluid may then travel between the outer shell **20** and the soft membrane layer **30**, before being projected as a stream or a jet of fluid out of the outlet holes of each U-shaped manifold **300**. In this way, a jet of fluid may be provided onto a user's teeth through the soft membrane layer **30** and/or holes in the inner shell **10**.

Regarding the aforementioned rotating inlet joint **200**, the rotating inlet joint **200** consistent with the present disclosure may interface with a variety of methods for delivering fluid, past the joint, into each manifold. These include, but are not limited to, fluid pumps, faucet or showerhead attachments, cordless handles, pressurized fluid containers, dental equipment, and other fluid delivery solutions.

The present disclosure describes two manifold components **300**, a rotating inlet joint **200**, the function, and low friction movement aspects of the apparatus **100**. Each manifold component **300** may be designed in a U-shape with aligned fluid orifices over the buccal and lingual sides of teeth. Accordingly, the two manifolds **300** may be combined to cover both top and bottom teeth at the same time. The apparatus **100** may be designed with respect to ergonomics. Data from ergonomics research necessitated the design of the apparatus **100** as, for example, two U-shapes combined, single U-shape, H-shape, X-shape, a chromosome shape, or similar shapes.

The rotating inlet joint **200** may be constructed in a manner to provide consistent, alternating, and/or pulsing fluid flow into each manifold **300** while allowing rotation, via the rotating inlet joint about a vertical axis of symmetry for comfortable movement across teeth. A joint may serve as a handle attaching the manifolds to enable necessary rotation. There are multiple methods of accomplishing the rotation of the joint **200**, each with their own practical/engineering considerations consistent with the present disclosure.

The function of the present disclosure includes the apparatus **100** being swept across the user's mouth from one rear molar to the other rear molar. FIG. **27** demonstrates apparatus **100** performing the sweeping motion. In some embodiments, rollers having a motive force applied via the inlet/handle and the tooth/gum line may guide the sweeping motion while the inlet joints rotates about the vertical axis.

The present disclosure provides advantages of the aforementioned manifolds **300** over conventional devices, including, but not limited to, for example:

- providing fast action when compared to single water jets, water picks, or water flossers, enabling the user to wash their mouth and floss more efficiently,
- providing an ability to be certain that the fluid is appropriately aimed to the appropriate portions of the user's teeth, as scientific literature shows that oral irrigation is most effective when delivered at a 90° angle, which is hard to maintain with a single fluid jet;
- providing ease of use when compared to a single fluid jets, water picks, and manual flossing, which may be especially important for children, elderly, and those with disabilities, for whom ease of use may be more of a medical necessity than a convenience;
- providing an ability to reclean specific sections of the user's teeth when compared to a mouthguard;
- providing an assurance that no spot is missed, no matter what how the user's teeth are structured; and
- providing low friction movement to allow for easy movement across the tooth/gum line and to minimize discomfort.

II. Various Configurations

FIG. **2**, illustrates an apparatus consistent with the present disclosure where the soft membrane **30** protrudes through the inner shell **10**. The protrusion may take the form of a pad **110** coming out through a cutout opening **115** in the inner shell **10**. The soft membrane pad **110** provides extra comfort for a user. The pad **110** may contain the holes for providing the fluid jets.

FIG. **3** illustrates an embodiment of the apparatus **100** with holes **125** on the inner shell **10**. The inner shell holes **125** may align with the holes on the soft membrane layer **120** to provide fluid jets. As with any embodiment consistent with the present disclosure, the holes may vary in size, thereby changing the fluid pressure of the jet and/or changing the volume of fluid exerted on to teeth.

In embodiments of the apparatus **100** wherein a fluid pump is present, the fluid pressure at the entrance point at the inlet opening of the inlet joint **200** may be limited. The pressure may be limited such that the pressure from fluid jets is non-destructive to user's gums. Limiting the fluid pressure may prevent user injury.

Consistent with some embodiments of the present disclosure, as the fluid flows through the apparatus **100**, the fluid pressure may drop. This represents a difference Δ between fluid pressure at the entrance point at the inlet opening of the inlet joint **200** and the fluid pressure as it exits the manifold **300** holes. In this way, the pressure loss inside of apparatus **100** may not exceed Δ. In some embodiments, the flow path inside the apparatus **100** may be small, for example on the order of tens of millimeters, which may minimize losses from straight sections. The remaining losses in pressure may be attributed primarily to one or more junctions, bends, constrictions, branches, and the like within the apparatus **100**. Embodiments may include, but not be limited to, the following junctions:

1. Inlet junction—where fluid flow changes direction within the inlet joint **200**, from the protruding inlet to the upper and lower manifolds **300**.
2. First manifold junction—where fluid flow changes direction as it enters the manifold **300** from the inlet joint **200**, and turns toward one side of the manifold **300**, such as buccal or lingual side.
3. Second manifold junction—where fluid flow changes direction from traveling laterally to traveling upward through the manifold **300** towards the openings.

In some embodiments of the apparatus **100** consistent with the present disclosure, the aforementioned inlet junction of the inlet joint **200** may comprise a rectangular form for maximal use of space. The pressure losses may be calculated by:

$$\delta p = k \cdot 0.5 \cdot \rho \cdot v^2$$

Assuming the length of the aforementioned rectangular inlet junction is a and the width is b, the hydraulic diameter of the rectangular duct may be calculated with:

$$D_r = 2 \cdot ab/(a+b)$$

As minor loss coefficients may not exist for a rectangular to circular t-junction, the hydraulic diameter of the rectangular duct may be substituted as an approximation and the minor loss coefficient for the circular t-junction k=2 may be used. With a total flow rate of Q, the pressure loss through the aforementioned inlet junction may be given by δp_1 where δp_1 may be calculated by:

$$\delta p_1 = \rho \cdot (Q/(0.5\pi D_r^2))^2$$

In some embodiments consistent with the present disclosure, the inlet joint **200** may provide rotation around a manifold **300**. The rotation may necessitate a circular form of the aforementioned first manifold junction. In some embodiments consistent with the present disclosure, the top and bottom manifolds may be joined by a retaining screw

55. In such embodiments, an opening for fluid passage in a form known to an ordinary artisan as an annulus may be formed between the retaining screw **55** and the rotating inlet joint **200**. The hydraulic diameter of the annulus may be calculated by:

$$D_a=(D_{out}^2-D_{in}^2)^{1/2}$$

As with the fluid pressure loss in the aforementioned inlet joint, the fluid pressure loss in the first manifold junction may be given by δp_2 where δp_2 may be calculated by:

$$\delta p_2=\rho\cdot(Q/(0.5\pi D_a^2))^2$$

In some embodiments consistent with the present disclosure, the second manifold junction may comprise a smooth right angle turn. The fluid pressure loss in the second manifold junction in the form of a smooth right angle turn is given by δp_3 which may be calculated by:

$$\delta p3=0.9\rho\cdot(Q/(\pi D_h^2))^2$$

The sum of the fluid pressure losses may be represented as Δ where Δ may be calculated by:

$$\Delta=\delta p_1+\delta p_2+\delta p_3$$

The equations, in combination with space constraints that depend on the specific embodiment, set the minimum diameters. Given the measurements of the apparatus **100**, maximum fluid pressure entering the apparatus **100** may be calculated or approximated using the aforementioned formulas. The maximum fluid pressure calculation may be used to further enhance the apparatus **100** by, for example, but not limited to, limiting fluid pressure provided by an external source to prevent damage to a user's gums. Consistent with various embodiments of the present disclosure, the apparatus **100** may contain soft protrusions surrounding the openings for jets **130**, as illustrated in FIG. **4**. The protrusions **130** may be part of the soft membrane **30** and designed to fit through a similarly shaped cutout in the inner shell **131**. As FIG. **4** illustrates, the cutout on one side of the apparatus **131** may be of a different shape than the cutout on the second side of the apparatus **132**. The aforementioned design may allow for fluid jets not to intersect, thereby cleaning teeth more effectively.

FIG. **4** also shows fluid channels **135** that may be designed within the soft membrane layer **30**. The fluid channels **135** direct fluid to the openings from which the fluid may be projected onto teeth. The fluid channels **135** may provide fluid conservation, enhanced control over fluid pressure, and enhanced seals with the outer shell **20**.

In certain embodiments consistent with the present disclosure, each U-shaped manifold **300** may have sides with different heights, as illustrated in FIG. **5**. The shorter side **141** may be designed to be located on the lingual side of the teeth, while the longer side **142** may be designed to be located on the buccal side. In some embodiments, the different height manifold may be present only on the top side of the apparatus **100**, only on the bottom side of the apparatus **100**, or both top and bottom sides of the apparatus **100**. For some users, the different heights may provide enhanced alignment of the apparatus **100** in the mouth and enhanced cleaning of teeth by covering a larger area with fluid flow.

FIG. **6** illustrates an embodiment of the apparatus **100** utilizing the aforementioned soft pads **110** and a rotating inlet joint **200** which may be transparent/translucent. The soft pads **110** may provide extra comfort, while the translucent joint **200** allows a user to see the fluid flow through the apparatus **100**. The joint **200** may range from fully opaque to fully transparent. The joint **200** may be constructed of any color, while opaque or translucent. Even though FIG. **6** discloses a rotating inlet joint **200** that is transparent, it should be understood that any and all parts of the apparatus **100** consistent with the present disclosure may have varying degree of transparency, ranging from fully opaque to fully transparent.

FIG. **7** illustrates an embodiment utilizing small, soft wheels **160** as guides for smooth movement of the apparatus **100** consistent with the present disclosure. The wheels **160** may be mounted on top of small enclosures **150**, containing motors, any device providing motive force, or any regulator of rotational resistance. The motor enclosures **150** may be attached to the apparatus **100** via sprung supports **155**. The sprung supports may be designed to provide slight back and forth movement of the motor enclosures **150** with slight resistance, providing better comfort and fitment for a larger group of users. The motion control mechanism comprising soft wheels **160**, motors inside motor enclosures **150** and sprung supports **155** may provide smooth movement of the apparatus by applying pressure along the gum line through the soft wheels **160**. The motion control mechanism may be mounted on the top manifold **300**, bottom manifold **300**, or both manifolds **300**. Alternately, the wheels **160** may be attached to both top and bottom ends of the motor enclosure **150**, thereby gliding along both top and bottom gun lines. The motors may be controlled with a computing device **900** consistent with the present disclosure. Alternately, the motors may be always activated during the powered-on state of the apparatus **100** consistent with the present disclosure. The motion control mechanism consistent with the present disclosure may be used to regulate the speed of the apparatus **100** sweeping motion within the user's mouth, providing optimal cleaning and preventing missed/under-cleaned areas.

In some embodiments of the apparatus **100**, the aforementioned motion control mechanism may be used to massage the gums. The massaging of gums may be accomplished by gliding the apparatus **100** back and forth along the gumline. The wheels **160** may be comprised of a material for optimum gum massage. In some embodiments consistent with the present disclosure, a vibration device may be mounted inside or near the motion control mechanism, causing the wheels **160** to vibrate and enhance the massage of the gun line.

Furthermore, in some embodiments of the apparatus **100**, the foregoing motion control mechanism may be used to remove plaque by gliding the apparatus along the teeth. The wheels **160** may be comprised of a material for optimum plaque removal. The aforementioned vibrating device may be employed to further enhance the removal of plaque. The plaque removal may be combined with the aforementioned gum massage in the apparatus **100** consistent with the present disclosure.

FIG. **8** illustrates a cutaway of an apparatus **100** with a height adjustment mechanism. The mechanism comprises a joint **200** which allows for travel of a manifold **300** via extra space **430**, a spring **420**, and a hard-stop mechanism **410** that prevents over extension. The spring **420** may decompress with fluid pressure, and recompress when a user applies force to the manifolds **300** with the user's teeth. The height adjustment mechanism may provide some flexibility in the height of the device, providing for better fluid jet alignment. The height adjustment mechanism may also provide extra comfort due to semi free-floating of the manifolds **300**. The height adjustment mechanism may adjust height based on pressure applied to the manifolds **300** by the user's teeth.

Better cleaning may be achieved by providing enhanced alignment of fluid jets with teeth. The mechanism may be activated by applying pressure to the manifolds **300** via the user's teeth. In some embodiments consistent with the present disclosure, the activation of the apparatus **100** may happen upon applying pressure to the aforementioned height adjustment mechanism. The activation may comprise, but not limited to, starting the flow of fluid, enabling the aforementioned motion control mechanism, and other features disclosed herein.

In some embodiments, the aforementioned height adjustment mechanism may act as a joint, joining the upper and lower manifolds **300**. In such embodiments, the rotating inlet joint **200** may be replaced with an alternate inlet mechanism.

The apparatus **100** consistent with some embodiments of the present disclosure may embody an anti-rotate mechanism, as illustrated in FIG. **9**. The mechanism may comprise an extrusion with a tip comprising of an uneven surface **440** on one manifold **300** and a socket **445** on the second manifold **300**, that accepts the tip **440** on the first manifold **300**, with a surface designed to match the tip **440**. By providing an uneven surface on the tip **440** and matching it on the socket **445**, the apparatus **100** prevents misalignment of the manifolds **300** and unwanted rotation.

FIG. **9** also illustrates openings for fluid **450** on the bottom of a manifold **300** consistent with the present disclosure. The openings **450** comprise cutaways in at approximately the center of the outer shell **20**. The openings **450** allow the fluid to flow into the manifold **300** to be projected onto teeth.

An apparatus **100** consistent with the present disclosure may alter the flow of fluid out of the openings forming jets. The flow of fluid may be altered for enhanced cleaning in multiple ways, such as, but not limited to:

- Pulsing—Where each jet may be activated for a short period of time, followed by a deactivation for a short period of time, then repeat of the cycle. Jets may be pulsed all together, independently, or in alternating manner.
- Alternating flow—Where activation of jets may be alternated between buccal and lingual sides and/or top and bottom manifolds **300**.

Consistent with the various embodiments of the present disclosure, the top/bottom alternation may be accomplished by a revolver part **460** mounted inside the rotating inlet joint **200**, as illustrated by the examples provided in FIG. **10**, FIG. **12** and FIG. **13**. Although embodiments herein a described with respect to a revolving characteristic of the flow control and distribution means, other implementations may be used to achieve flow control and distribution.

The revolver part **460** may be designed as, for example, a blower wheel, wherein the revolver part **460** has fins extending outward from the center, that may allow it to spin from fluid flowing past/through it. The rotating inlet joint **200** may comprise an offset wall to divert fluid flow, spinning the revolver **460** in the desired direction. The revolver part **460** may have upper and lower walls at each quarter of the revolver **460**. In some embodiments, every 50% may be blocked off in an alternated fashion on the top and bottom sides, projecting fluid in different directions, such as up or down. For example, first quarter may have the top blocked off, pushing fluid down, second quarter may have the bottom blocked off, pushing fluid up, third quarter may have the top blocked off, pushing fluid down, and fourth quarter may have the bottom blocked off, pushing fluid up.

In some embodiments, the outer shells **20** of the manifolds **300** may have two cutouts for fluid flow corresponding to the wheel **460** quarters positioned diagonally opposing each other, such that if you take two identical outer shells **20** and flip one on top of the other in a reflective manner, the quarters line up, as illustrated in FIG. **11**. In this way, the revolver **460** will only push fluid into one manifold **300** at a time. As the revolver **460** spins, its top openings may line up with the openings on the top manifold **300**, providing an upward flow of fluid, while the bottom openings may line up with the walls on the bottom manifold **300**, blocking the downward flow of fluid. As the fluid continues to flow, the revolver **460** may continue to spin, which in turn may allow its top openings to line up with the walls on the top manifold **300**, blocking an upward flow of fluid, while the bottom openings may line up with the openings on the bottom manifold **300**, providing the downward flow of fluid. Different fluid pressure may be provided in order to alter the rate of revolver **460** spinning, thereby altering how often the flow switches from top to bottom manifold **300**, and vice versa.

Still consistent with embodiments of the present disclosure, the buccal/lingual alternation may be accomplished by a revolver part **470** mounted inside the rotating inlet joint **200**, as illustrated by the examples provided in FIG. **10**, FIG. **12** and FIG. **14**. The revolver part **470** may be designed as, for example, a blower wheel, wherein the revolver part **470** has fins extending outward from the center, that may allow it to spin from fluid flowing past/through it. The rotating inlet joint **200** may comprise an offset wall to divert fluid flow, spinning the revolver **470** in the desired direction. The revolver part **470** may have upper and lower walls each half of the revolver **470**, wherein every 50% is blocked off in an alternated fashion on the top and bottom sides, projecting fluid in different directions, such as up or down. For example, first half has the top blocked off, pushing fluid in one direction, second half has the bottom blocked off, pushing fluid in another direction, whereby one manifold will receive the fluid only on the buccal side, and the second manifold will only receive fluid on the lingual side. Different fluid pressure may be provided in order to alter the rate of revolver **470** spinning, thereby altering how often the flow switches from buccal to lingual side of the manifold **300**, and vice versa.

In some embodiments, the manifolds **300** may have two cutouts for fluid flow corresponding to the revolver **470** halves positioned opposing each other, such that each opening may provide the flow of fluid to the corresponding side, buccal or lingual, of the manifold only. In this way, the revolver **470** may only push fluid into one side of a manifold **300** at a time. As the revolver **470** spins, its openings may line up with one opening on the top manifold **300** and another opening on the bottom manifold **300**, providing an upward and downward flow of fluid to the corresponding buccal/lingual side of each manifold **300**. As the fluid continues to flow, the revolver **470** may continue to spin, which in turn may allow its top openings to line up with the openings on the opposite side of each manifold **300**, switching the flow from buccal to lingual side on each manifold **300**, and vice versa. Different fluid pressure may be provided in order to alter the rate of revolver **470** spinning, thereby altering how often the flow switches from top to bottom manifold **300**, and vice versa. In some embodiments consistent with the present disclosure, alteration of the flow may be binary or sinusoidal.

In various embodiments, the flow of the fluid may be altered based on position of the apparatus **100** within a

mouth and/or speed with which the apparatus **100** glides within a mouth. Here, the apparatus **100** may comprise one or more sensing devices (e.g., as further disclosed with reference to computing device **900**) that senses the location of the rotating inlet joint **200**. A computing device **900** consistent with the present disclosure may monitor the sensor, and therefore monitor the current angle of the rotating inlet joint **200** relative to the manifolds **300**, and calculate the rate of change of the angle.

As an example, based on the current angle of the rotating inlet joint **200**, the computing device **900** may derive the current location within a mouth. Based on the calculated rate of change of the angle, the computing device **900** may derive the speed of gliding within a mouth. The rotating inlet joint **200** may be designed with four channels of fluid flow **480**, as illustrated by the examples provided in FIG. **15**.

FIG. **16** illustrates how different angles of the rotating inlet joint **200** may allow the fluid to flow from different channels into different manifolds **300** and/or different sides of the manifold. The computing device **900** may notify the user of the speed and location of the apparatus **100**. By controlling which channel the fluid flows through at any given time, the computing device **900** may alter the fluid flow in numerous ways, such as, but not limited to:

- Alternating flow from buccal to lingual based on location and/or speed;
- Alternating from top to bottom based on location and/or speed;
- Pulse based on location and/or speed;
- Pulse and alternate flow based on location and/or speed;
- Change fluid pressure based on location and/or speed;
- Change fluid pressure and pulse based on location and/or speed;
- Change fluid pressure and alternate flow based on location and/or speed; and
- Change fluid pressure, pulse and alternate flow based on location and/or speed.

The aforementioned fluid flow control methods may be used individually, or in combination with each other. Furthermore, an apparatus consistent with the present disclosure may control each jet individually, with or without a computing device **900**.

FIGS. **17**, **18**, **19**, **20**, **21**, **22**, **23**, **24**, **25** and **26** illustrate different embodiments of hole layouts for providing jets of fluid expelled out an apparatus **100**. **510** illustrates a layout on one side of the manifold **300**, while **520** illustrates a layout on the second side of the manifold **300**. Each side could be used on either the buccal or lingual side of the manifold. **530** illustrates a superposition of the orifices, wherein the first side layout **510** is superimposed on the second side layout **520**. In some embodiments, each of the two sides can have similar layouts. In other embodiments, the layouts can be staggered, or asymmetrical, such that the jets of fluid being expelled from one side **510** do not line up with the jets of fluid being expelled from the second side **520**. Staggered layout may be preferred, as it provides improved cleaning compared to a layout where jets line up. Furthermore, staggered layout may provide increased safety by reducing the pressure exerted onto user's gums.

FIG. **27** illustrates an apparatus **100** consistent with the present disclosure within a human jaw. While the jaw is that of a 50^{th} percentile human male for illustrative purposes, it should be understood the apparatus may be used to clean teeth of any mammal, or any object vaguely resembling the shape of teeth that could be cleaned in a sweeping manner.

Certain embodiments of the apparatus **100** consistent with the present disclosure may contain additional features, such as, but not limited to:

- Toothbrush bristles may be mounted on the interior surfaces of the inner shell **100**. The toothbrush bristles may allow to brush teeth while flossing for an enhanced cleaning.
- UV and or IR illumination paired with a camera or an optical sensor to detect plaque and alert the user. The aforementioned devices and alerts may be controlled by a computing device **900** consistent with the present disclosure, which may also record the data to any medium compatible with the computing device **900** or the cloud. Furthermore, the recordings may automatically be uploaded to the platform operated by a dental practice or a medical entity.
- Camera to record the gumline for future review, historical data, for a dentist, or for a study conducted by a third party. The camera may be controlled by a computing device **900**, which may also save the recordings to any medium compatible with the computing device **900** or the cloud. Furthermore, the recordings may automatically be uploaded to the platform operated by a dental practice or a medical entity, platform of user's choice, or a third party conducting a study.
- UV cleaning illumination, by use of ultraviolet germicidal irradiation or other methods. UV cleaning may reduce bacteria within a mouth. UV cleaning may be provided via use of UV light emitting diodes (LEDs) projected inside a mouth. UV cleaning may be used to clean the disclosed apparatus. In some embodiments consistent with the present disclosure, the cleaning may be performed by a different wavelength of the electromagnetic spectrum, such as, but not limited to, infrared or x-ray.
- Plaque removing device, such as an aforementioned motion control mechanism or another mechanism. The disclosed mechanism may reduce and/or remove plaque with or without a computing device **900**.

As may be apparent to a person having ordinary skill in the art, the features described herein may be combined with each other, creating numerous embodiments of the apparatus **100** consistent with the present disclosure. For example, an apparatus **100** consistent with the present disclosure may comprise soft pads protruding from the inner shell **10**, fluid channels **135** embedded in the soft membrane **30**, different height manifolds **300**, tinted translucent rotating inlet joint **200** with, for example, multiple fluid channels (e.g., four), motion control mechanism with vibration, spring height adjustment, anti-rotate mechanism, alternating and pulsating jets based on speed and location of the apparatus **100** within a mouth, orifice patterns that do not intersect, toothbrush bristles, UV cleaning, gum massaging, cameras for gum recording and plaque detection, and be controlled by a computing device **900**.

Consistent with the present disclosure, the joints and various components may be used with any of the proposed shapes of the apparatus **100** including the shapes depicted in the figures. Embodiments of the present disclosure, for example, are described above with reference to diagrams and/or operational illustrations of methods, systems, and apparatuses according to embodiments of the disclosure. The functions/acts noted in the U-shaped manifold **300** and/or components may occur out of the order as shown in any figure. For example, two U-shaped manifolds **300** shown in succession may in fact be executed substantially

concurrently or the U-shaped manifolds **300** may sometimes be executed in the reverse order, depending upon the functionality/acts involved.

While certain embodiments of the disclosure have been described, other embodiments may exist. For example, an embodiment may exist wherein a suction tube is attached to the handle such that the tube sucks up the fluid in a user's mouth, avoiding a potential mess and providing extra comfort. The suction tube may also be built within the apparatus **100** consistent with the present disclosure. Additionally, another embodiment consistent with the present disclosure uses a X-shaped head. The X-shaped head may be configured to have a V-shape for the upper teeth and the lower teeth together. In another embodiment, a U-shaped or a V-shaped manifold head may be configured to function on either the upper teeth or lower teeth at one time. The manifold head may be alternatively used for the upper teeth or lower teeth for the entire mouth of a user. In the embodiments, the U-shape manifold **300** may be rounded or square at the corners for the best fit in a user's mouth. Yet another embodiment consistent with the present disclosure may comprise an H-shaped apparatus that cleans both upper and lower teeth at the same time. While certain embodiments of the disclosure have been described, other embodiments may exist.

III. Integrated and External Computing Devices

The apparatus **100** consistent with the present disclosure may be controlled by a computing device **900**. The computing device **900** may comprise, but not be limited to; an embedded microcontroller within the apparatus, or a mobile computing device, or a microcomputer embedded in the pump system, or a remote computing device that communicates via various methods understood by a person having ordinary skill in the art.

Embodiments of the present disclosure may comprise a system having a central processing unit (CPU) **920**, a bus **930**, a memory unit **940**, a power supply unit (PSU) **950**, and one or more Input/Output (I/O) units. The CPU **920** coupled to the memory unit **940** and the plurality of I/O units **960** via the bus **930**, all of which are powered by the PSU **950**. It should be understood that, in some embodiments, each disclosed unit may actually be a plurality of such units for the purposes of redundancy, high availability, and/or performance.

FIG. **28** is a block diagram of a system including computing device **900**. Consistent with an embodiment of the disclosure, the aforementioned CPU **920**, the bus **930**, the memory unit **940**, a PSU **950**, and the plurality of I/O units **960** may be implemented in a computing device, such as computing device **900** of FIG. **28**. Any suitable combination of hardware, software, or firmware may be used to implement the aforementioned units. For example, the CPU **920**, the bus **930**, and the memory unit **940** may be implemented with computing device **900** or any of other computing devices **900**, in combination with computing device **900**. The aforementioned system, device, and components are examples and other systems, devices, and components may comprise the aforementioned CPU **920**, the bus **930**, the memory unit **940**, consistent with embodiments of the disclosure.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ a communication system that transfers data between components inside the aforementioned computing device **900**, and/or the plurality of computing devices **900**. The aforementioned communication system will be known to a person having ordinary skill in the art as a bus **930**. The bus **930** may embody internal and/or external plurality of hardware and software components, for example, but not limited to a wire, optical fiber, communication protocols, and any physical arrangement that provides the same logical function as a parallel electrical bus. The bus **930** may comprise at least one of, but not limited to a parallel bus, wherein the parallel bus carry data words in parallel on multiple wires, and a serial bus, wherein the serial bus carry data in bit-serial form.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ hardware integrated circuits that store information for immediate use in the computing device **900**, known to the person having ordinary skill in the art as primary storage or memory **940**.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ the communication system between an information processing system, such as the computing device **900**, and the outside world, for example, but not limited to, human, environment, and another computing device **900**. The aforementioned communication system will be known to a person having ordinary skill in the art as I/O **960**. The I/O module **960** regulates a plurality of inputs and outputs with regard to the computing device **900**, wherein the inputs are a plurality of signals and data received by the computing device **900**, and the outputs are the plurality of signals and data sent from the computing device **900**. The I/O module **960** interfaces a plurality of hardware, such as, but not limited to, non-volatile storage **961**, communication devices **962**, sensors **963**, and peripherals **964**. The plurality of hardware is used by the at least one of, but not limited to, human, environment, and another computing device **900** to communicate with the present computing device **900**. The I/O module **960** may comprise a plurality of forms, for example, but not limited to channel I/O, port-mapped I/O, asynchronous I/O, and Direct Memory Access (DMA).

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ the non-volatile storage sub-module **961**, which may be referred to by a person having ordinary skill in the art as one of secondary storage, external memory, tertiary storage, off-line storage, and auxiliary storage. The non-volatile storage sub-module **961** may not be accessed directly by the CPU **920** without using intermediate area in the memory **940**. The non-volatile storage sub-module **961** does not lose data when power is removed and may be two orders of magnitude less costly than storage used in memory module, at the expense of speed and latency.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ the communication sub-module **962** as a subset of the I/O **960**, which may be referred to by a person having ordinary skill in the art as at least one of, but not limited to, computer network, data network, and network. The network allows computing devices **900** to exchange data using connections, which may be known to a person having ordinary skill in the art as data links, between network nodes. The nodes comprise network computer devices **900** that originate, route, and terminate data. The nodes are identified by network addresses and can include a plurality of hosts consistent with the embodiments of a computing device **900**. The aforementioned embodiments include, but not limited to personal

computers, phones, servers, drones, and networking devices such as, but not limited to, hubs, switches, routers, modems, and firewalls.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ the sensors sub-module **963** as a subset of the I/O **960**. The sensors sub-module **963** comprises at least one of the devices, modules, and subsystems whose purpose is to detect events or changes in its environment and send the information to the computing device **900**. Sensors are sensitive to the measured property, are not sensitive to any property not measured, but may be encountered in its application, and do not significantly influence the measured property. The sensors sub-module **963** may comprise a plurality of digital devices and analog devices, wherein if an analog device is used, an Analog to Digital (ADC, A-to-D) converter must be employed to interface the said device with the computing device **900**. The sensors may be subject to a plurality of deviations that limit sensor accuracy. The sensors sub-module **963** may comprise a plurality of embodiments, such as, but not limited to, chemical sensors, automotive sensors, acoustic/sound/vibration sensors, electric current/electric potential/magnetic/radio sensors, environmental/weather/moisture/humidity sensors, flow/fluid velocity sensors, ionizing radiation/particle sensors, navigation sensors, position/angle/displacement/distance/speed/acceleration sensors, imaging/optical/light sensors, pressure sensors, force/density/level sensors, thermal/temperature sensors, and proximity/presence sensors.

Consistent with the embodiments of the present disclosure, the aforementioned computing device **900** may employ the peripherals sub-module **962** as a subset of the I/O **960**. The peripheral sub-module **964** comprises ancillary devices uses to put information into and get information out of the computing device **900**. There are 3 categories of devices comprising the peripheral sub-module **964**, which exist based on their relationship with the computing device **900**, input devices, output devices, and input/output devices. Input devices send at least one of data and instructions to the computing device **900**. Input devices can be categorized based on, but not limited to:

- Modality of input such as, but not limited to, mechanical motion, audio, and visual.
- Whether the input is discrete, such as but not limited to, pressing a key, or continuous such as, but not limited to, the position of a mouse.
- The number of degrees of freedom involved such as, but not limited to, two-dimensional mice vs three-dimensional mice used for Computer-Aided Design (CAD) applications.

Output devices provide output from the computing device **900**. Output devices convert electronically generated information into a form that can be presented to humans. Input/output devices perform that perform both input and output functions.

Audio input devices are used to capture sound. In some cases, an audio output device can be used as an input device, in order to capture produced sound. Audio input devices allow a user to send audio signals to the computing device **900** for at least one of processing, recording, and carrying out commands. Devices such as microphones allow users to speak to the computer in order to record a voice message or navigate software. Aside from recording, audio input devices are also used with speech recognition software. Examples of types of audio input devices include, but not limited to microphone, Musical Instrument Digital Interface (MIDI) devices such as, but not limited to a keyboard, and headset.

IV. Aspects

The following disclose various Aspects of the present disclosure. The various Aspects are not to be construed as patent claims unless the language of the Aspect appears as a patent claim. The Aspects describe various non-limiting embodiments of the present disclosure.

Aspect 1. An apparatus comprising:

- a. Two hollow U-shaped manifolds having holes located on their interior faces;
  - i. Wherein the U-shaped manifolds are designed to receive the top and bottom sets of teeth into an interior of each corresponding U-shaped manifold;
  - ii. Wherein the holes are used for providing fluid jets;
    1. Wherein the holes are aligned towards the lingual and buccal side of the teeth for staggered arrangement of the jets;
  - iii. Wherein the U-shaped manifolds may be connected, at a central point of reflection, by a rotating inlet joint which supplies the fluid for the jets;
- b. A design enabling dental irrigation with a controlled fluid flow by moving the apparatus in a sweeping motion between each set of rear molars.

Aspect 2. The apparatus of aspect 1, with motive force applied to gums to translate the apparatus around a mouth.

Aspect 3. The apparatus of aspect 1, wherein the rotating inlet joint encompasses an anti-rotate feature for the U-shaped manifolds.

Aspect 4. The apparatus of aspect 1, wherein the U-shaped manifolds comprise a protruding soft membrane.

Aspect 5. The apparatus of aspect 1, wherein the rotating inlet joint is used for the control mechanism for alternating jets between the faces of the U-shaped manifolds based on the position of the apparatus inside a mouth.

Aspect 6. The apparatus of aspect 5, wherein a user may configure a method of alteration.

Aspect 7. The apparatus of aspect 1, wherein the rotating inlet joint is used for the control of fluid pressure based on the position of the apparatus inside a mouth.

Aspect 8. The apparatus of aspect 1, wherein the rotating inlet joint comprises a revolver that alternates jets between each U-shaped manifold surface.

Aspect 9. The apparatus of aspect 1, wherein the extremities of the apparatus have electromagnetic wave sources attached.

Aspect 10. The apparatus of aspect 1, wherein the interiors of the U-shaped manifolds have toothbrush bristles attached.

Aspect 11. The apparatus of aspect 1, wherein the extremities of the apparatus have electromagnetic wave capturing devices attached.

V. Claims

While the specification includes examples, the disclosure's scope is indicated by the following claims. Furthermore, while the specification has been described in language specific to structural features and/or methodological acts, the claims are not limited to the features or acts described above.

Rather, the specific features and acts described above are disclosed as example for embodiments of the disclosure.

Insofar as the description above and the accompanying drawing disclose any additional subject matter that is not within the scope of the claims below, the disclosures are not dedicated to the public and the right to file one or more applications to claims such additional disclosures is reserved.

The invention claimed is:

1. An apparatus for dental irrigation, the apparatus comprising:

a first manifold having a first plurality of outlet holes laid out on a first wall of the first manifold and a second wall of the first manifold, wherein the first wall approximately faces the second wall, and wherein the first plurality of outlet holes on the first wall of the first manifold are approximately oriented towards the first plurality of outlet holes on the second wall of the first manifold;

a second manifold having a second plurality of outlet holes laid out on a first wall of the second manifold and a second wall of the second manifold, wherein the first wall approximately faces the second wall, wherein the second plurality of holes on the first wall of the second manifold are approximately oriented towards the second plurality of holes on the second wall of the second manifold, and

wherein the first manifold and the second manifold are positioned so as to approximately:

align with an approximately common axis of symmetry, and

reflect about a central point of reflection, such that each of the first and the second manifolds are oriented in opposite directions; and

a rotating inlet joint comprising an inlet channel to receive fluid and channel the fluid in substantially opposing directions into:

the first manifold towards the first plurality of outlet holes, such that the fluid is channeled to be expelled from the first plurality of outlet holes approximately towards the axis of symmetry, and

the second manifold towards the second plurality of outlet holes, such that the fluid is channeled to be expelled from the second plurality of holes approximately towards the axis of symmetry,

wherein the rotating inlet joint is positioned in between the first manifold and the second manifold,

wherein the rotating inlet joint connects to the first manifold at a first inlet portion at approximately a base of the first manifold, and

wherein the rotating inlet joint connects to the second manifold at a second inlet portion at approximately a base of the second manifold,

wherein the inlet channel of the rotating inlet joint protrudes from the rotating inlet joint to form an angle relative to the axis of symmetry, and

wherein the rotating inlet joint is configured to rotate about the axis of symmetry to enable the inlet channel to turn about the axis of symmetry without blocking a flow of fluid from the inlet channel to the first manifold and the second manifold.

2. The apparatus of claim **1**, wherein the first manifold is configured to receive a user's upper teeth, wherein the second manifold is configured to receive the user's lower teeth, and wherein the rotating inlet joint is designed to accommodate the user's teeth arrangement by a location of the first inlet portion of the first manifold and the second inlet portion of the second manifold.

3. The apparatus of claim **2**, wherein a combined design of the first manifold, the second manifold, and the rotating inlet joint enables the user to sweep the apparatus from one side of the user's mouth to the other side of the user's mouth while the user's teeth are within each corresponding manifold.

4. The apparatus of claim **3**, wherein the rotating inlet joint is configured to rotate about the axis of symmetry as the user sweeps the first manifold and the second manifold within the user's mouth, without obstructing the flow of fluid from the inlet channel to the first plurality of outlet holes and the second plurality of holes.

5. The apparatus of claim **1**, wherein the first plurality of outlet holes and the second plurality of holes are configured to expel the fluid to form jets.

6. The apparatus of claim **5**, wherein the jets formed from the first wall of each of the manifolds are arranged to be offset from the jets formed from the second wall of each of manifolds.

7. The apparatus of claim **1**, wherein the fluid flow alternates between the first manifold and the second manifold.

8. The apparatus of claim **1**, wherein the fluid flow alternates from the first wall of each of the manifolds to the second wall of each of the manifolds.

9. The apparatus of claim **8**, wherein the alternating fluid flow is provided by a flow alternating part.

10. The apparatus of claim **9**, wherein the part is mounted inside the rotating inlet joint between the first manifold and second manifold.

11. The apparatus of claim **10**, wherein the part comprises a blower wheel, having fins which, when interfacing with the fluid flow, cause the part to rotate.

12. The apparatus of claim **11**, wherein the rotating inlet joint comprises an offset wall to divert the fluid flow, spinning the blower wheel in a particular direction.

13. The apparatus of claim **11**, wherein the part is divided into four quadrants, such that quadrant one and quadrant three block upward fluid flow, allowing downward fluid flow, and quadrant two and quadrant four block the downward fluid flow, allowing upward fluid flow.

14. The apparatus of claim **13**, wherein each of the manifolds comprises cutouts for each channel of the fluid flow corresponding to openings designed within the part, such that, as the part rotates, the part's openings align, in alternating fashion, with the cutouts of each of the manifolds, thereby enabling each channel of the fluid flow into each of the manifolds.

15. The apparatus of claim **14**, wherein the part is divided into the four quadrants, such that quadrant one and quadrant three block the fluid flow to the first manifold while allowing the fluid flow to the second manifold, and quadrant two and quadrant four block the fluid flow to the second manifold while allowing the fluid flow to the first manifold.

16. The apparatus of claim **11**, wherein the part is divided into two halves, such that a first half blocks upward fluid flow, allowing downward fluid flow, and a second half blocks the downward fluid flow, allowing upward fluid flow.

17. The apparatus of claim **16**, wherein each of the manifolds comprises two cutouts for fluid flow corresponding to the part halves, such that the two cutouts provide the fluid flow to the corresponding buccal and lingual sides of each of the manifolds.

18. The apparatus of claim **17**, wherein, as the part spins, an open half of the part lines up with the first inlet portion

of the first manifold and the second inlet portion of the second manifold, in sequence, providing an alternating upward and downward fluid flow to the corresponding buccal and lingual side of each of the manifolds.

19. The apparatus of claim **11**, wherein fluid pressure determines the rate of spin for the part.

20. The apparatus of claim **1**, wherein a spring is mounted inside the rotating inlet joint, applying opposing pressure to the first manifold and the second manifold, wherein the spring enables a range of motion between the first manifold and the second manifold, such that the first manifold may be configured to move closer to, and further away from, the second manifold.

21. The apparatus of claim **20**, wherein the spring decompresses as fluid flow increases pressure within the inlet joint.

22. The apparatus of claim **20**, wherein the spring compresses when a user provides pressure to the first manifold with upper teeth and second manifold with lower teeth.

23. The apparatus of claim **22**, where the compression of the spring improves an alignment of the user's teeth within each of the manifolds.

24. The apparatus of claim **1**, further comprising at least one roller having a motive force applied to a user's gums to translate the apparatus around the user's mouth.

25. The apparatus of claim **24**, further comprising a first roller directed towards the user's upper gum-line, and a second roller directed towards a user's lower gum-line.

26. The apparatus of claim **25**, wherein the at least one roller is used to massage gums.

27. The apparatus of claim **24**, wherein the at least one roller is configured to remove plaque.

28. An apparatus for dental irrigation designed to project fluid directly onto surfaces of, and interproximal spaces between, a user's teeth and gum-line, the apparatus comprising:

a first approximately U-shaped manifold comprising:

a first plurality of outlet holes located on a first interior face of the first U-shaped manifold,

a second plurality of outlet holes located on a second interior face of the first U-shaped manifold, and

a first inlet hole at approximately a base of the first U-shaped manifold,

wherein the first plurality of outlet holes of the first interior face of the first U-shaped manifold are asymmetrically aligned relative to the second plurality of outlet holes on the second interior face of the first U-shaped manifold;

a second approximately U-shaped manifold comprising:

a third plurality of outlet holes located on a first interior face of the second U-shaped manifold,

a fourth plurality of outlet holes located on a second interior face of the second U-shaped manifold, and

a second inlet hole at approximately a base of the second U-shaped manifold,

wherein the third plurality of outlet holes of the first interior face of the second U-shaped manifold are asymmetrically aligned relative to the fourth plurality of outlet holes on the second interior face of the second U-shaped manifold;

a rotating inlet joint comprising:

an inlet channel to receive the fluid,

a first opening to channel the received fluid towards the first inlet hole of the first U-shaped manifold, and

a second opening to channel the received fluid towards the second inlet hole of the second U-shaped manifold,

wherein the first opening and the second opening are oriented in substantially opposite directions, and

wherein the inlet channel is positioned substantially perpendicularly and approximately in between the first opening and the second opening,

wherein the rotating inlet joint connects the first U-shaped manifold and the second U-shaped manifold to form an approximately H-shaped manifold, and

wherein the H-shaped manifold is configured to channel the fluid received from the inlet channel to the first plurality of outlet holes, the second plurality of outlet holes, the third plurality of outlet holes, and the fourth plurality of outlet holes, and

wherein the rotating inlet joint is configured to rotate about an approximately vertical axis of symmetry of the H-shaped manifold to enable the inlet channel to turn about the vertical axis of symmetry without:

altering a position of the first U-shaped manifold and the position of the second U-shaped manifold, and

blocking a flow of the fluid from the inlet channel to each of the first and the second manifolds.

29. The apparatus of claim **28**, wherein the asymmetrical alignment of the first plurality of outlet holes and the second plurality of holes enables the flow of the fluid towards the vertical axis of symmetry of the H-shaped manifold in a staggered layout.

30. The apparatus of claim **28**, wherein the asymmetrical alignment of the third plurality of outlet holes and the fourth plurality of outlet holes enables the flow of the fluid towards the vertical axis of symmetry of the H-shaped manifold in a staggered layout.

31. The apparatus of claim **28**, wherein the H-shaped manifold is configured to receive at least one upper tooth of the user's in the first U-shaped manifold and at least one bottom tooth of the user's in the second U-shaped manifold.

32. The apparatus of claim **31**, wherein the user is enabled to sweep the H-shaped manifold from one side of the user's mouth the other side of the user's mouth.

33. The apparatus of claim **32**, wherein the rotating inlet joint is configured to rotate about the vertical axis of symmetry as the user sweeps the H-shaped manifold within the user's mouth, without obstructing the flow of fluid from the inlet channel to the first plurality of outlet holes and the second plurality of holes.

34. The apparatus of claim **28**, wherein the first plurality of outlet holes and the third plurality of outlet holes are aligned towards the lingual side of the user's teeth, and wherein the second plurality of outlet holes and the fourth plurality of outlet holes are aligned towards the buccal side of the user's teeth.

35. The apparatus of claim **34**, wherein a positioning of each of the plurality of outlet holes enables a staggered flow of fluid towards the user's teeth.

36. The apparatus of claim **28**, wherein the fluid flow alternates between the first manifold and the second manifold.

37. The apparatus of claim **36**, wherein the alternating fluid flow is provided by a flow alternating revolver part.

38. The apparatus of claim **37**, wherein the revolver part is mounted inside the rotating inlet joint between the first manifold and second manifold.

39. The apparatus of claim **38**, wherein each of the manifolds comprises two cutouts for fluid flow corresponding to the revolver part halves, such that the two cutouts

provide the fluid flow to the corresponding buccal and lingual sides of each of the manifolds.

40. The apparatus of claim **39**, wherein, as the revolver part spins, an open half of the revolver part lines up with the first inlet hole of the first manifold and the second inlet hole of the second manifold, sequentially, providing an alternating upward and downward fluid flow to the corresponding buccal and lingual side of each of the manifolds.

41. The apparatus of claim **38**, wherein the revolver part comprises a blower wheel, having fins which, when interfaces with the fluid flow, cause the revolver to rotate.

42. The apparatus of claim **41**, wherein the revolver part is divided into four quadrants, such that quadrant one and quadrant three block the fluid flow to the first manifold while allowing the fluid flow to the second manifold, and quadrant two and quadrant four block the fluid flow to the second manifold while allowing the fluid flow to the first manifold.

43. The apparatus of claim **42**, wherein each of the first and second manifolds comprises cutouts for the fluid flow corresponding to the revolver part quarters, such that, as the revolver rotates, its openings align, in alternating fashion, with the cutouts of each of the manifolds, enabling the fluid flow into each of the manifolds.

44. The apparatus of claim **43**, wherein, as the revolver part spins, the revolver part cutouts line up with the first inlet hole of the first manifold and the second inlet hole of the second manifold, providing an alternating upward and downward fluid flow to the corresponding buccal and lingual side of each of the manifolds.

45. The apparatus of claim **41**, wherein fluid pressure determines a rate of revolver part spin.

46. The apparatus of claim **28**, wherein the fluid flow alternates from one interior face of each of the manifolds to the other interior face of each of the manifolds.

47. The apparatus of claim **28**, wherein a spring is mounted inside the rotating inlet joint, applying opposing pressure to the first manifold and the second manifold.

48. The apparatus of claim **47**, wherein the spring decompresses as the fluid flow provides pressure within the inlet joint.

49. The apparatus of claim **47**, wherein the spring compresses when the user provides pressure to the first manifold with upper teeth and the second manifold with lower teeth.

50. The apparatus of claim **49**, where the compression of the spring improves an alignment of the user's teeth within each of the manifolds.

51. The apparatus of claim **28**, further comprising at least one roller having a motive force applied to the user's gums to translate the apparatus around the user's mouth.

52. The apparatus of claim **51**, further comprising a first roller directed towards the user's upper gum-line, and a second roller directed towards the user's lower gum-line.

53. The apparatus of claim **52**, wherein the at least one roller is configured to remove plaque.

54. The apparatus of claim **51**, wherein the at least one roller is used to massage gums.

55. An apparatus for dental irrigation designed to project fluid directly onto surfaces of, and interproximal spaces between, a user's teeth and gum-line, the apparatus comprising:

a first manifold segment having at least one first inlet and a first plurality of outlet holes;

a second manifold segment having at least one second inlet and a second plurality of outlet holes; and

a rotating inlet segment comprising an inlet channel to receive the fluid and channel the fluid in substantially opposing directions into the first manifold through the at least one first inlet and into the second manifold through the at least one second inlet,

wherein the rotating inlet segment, the first manifold segment, and the second manifold are positioned so as to approximately:

align with an approximately central vertical axis of symmetry, and

reflect about an approximately central horizontal axis of symmetry, such that the first manifold and the second manifold are positioned at opposite sides of the rotating inlet segment and are oriented in opposite directions; and

wherein the rotating inlet segment is configured to rotate about the axis of common symmetry to enable the inlet channel to turn about the axis of symmetry,

wherein an angle of the rotating inlet segment impacts a property of the fluid flow to the user's teeth, the angle being relative to at least one of the following: the vertical axis of symmetry and the horizontal axis of symmetry.

56. The apparatus of claim **55**, further comprising a means to measure the angle of the rotating inlet segment to ascertain an approximate position of the apparatus within the user's mouth.

57. The apparatus of claim **56**, wherein a change in the position is used to calculate a speed of motion of the apparatus across the user's mouth.

58. The apparatus of claim **57**, further comprising a means for providing notifications to the user if the user is moving the apparatus at least one of too slow and too fast.

59. The apparatus of claim **56**, wherein the fluid flow is configured to alternate from buccal side to lingual side based on the position.

60. The apparatus of claim **56**, wherein the fluid flow alternates from the first manifold segment to the second manifold segment based on the position.

61. The apparatus of claim **56**, wherein fluid pressure is controlled based on the position.

62. The apparatus of claim **55**, further comprising toothbrush bristles that protrude from interior faces of manifold segment one and manifold segment two.

63. The apparatus of claim **55**, further comprising a means for generating electromagnetic waves to sterilize at least one of the user's teeth and the apparatus.

64. The apparatus of claim **55**, further comprising cameras to record at least one of the user's gum line and the user's teeth.

65. The apparatus of claim **55**, further comprising a means for generating electromagnetic radiation to illuminate the user's teeth.

66. The apparatus of claim **65**, further comprising an electromagnetic wave detector to detect a reflection of the illumination to detect plaque.

67. The apparatus of claim **55**, wherein a first side of the first manifold segment has a different height than a second side of the first manifold segment.

68. The apparatus of claim **55**, wherein a first side of the second manifold segment has a different height than a second side of the second manifold segment.

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